



JUST ANOTHER GARMENT

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ABSTRACT

Looking at the challenges faced by the ageing population I focused on one key problem of daily life that can negatively impact many other aspects, a pivotal factor contributing to mental well-being and quality of life.

Practical solutions exist in the form of adult diapers, but these do nothing to address the emotional side of this common problem. By developing washable protective underwear for women suffering from mild incontinence I questioned the stigma of the daily living aid and how designers could re-design the experience of an aid, contributing to a persons well-being. This topic was approached through inclusive design principles implementing an active participatory methodology.

INTRODUCTION



Spanning three generations: my grandmother, mother and myself.

For my final 2014 graduation project at Design Academy Eindhoven I was inspired by the challenges faced by my elderly grandparents, and the aging population in general, to maintain their independence. I focused on one key problem of daily life which can negatively impact many other aspects, a pivotal factor contributing to mental well-being and quality of life.

My interest was sparked by witnessing my grandfather feel ashamed after losing some bladder control. As a result he no longer felt comfortable to go on walks or to social events for fear of not making it to the toilet in time. As a designer, I felt a responsibility to do something about this, not only in a practical sense, but also to explore and challenge the stigma of incontinence. Practical solutions exist in the form of adult diapers, but these do nothing to address the emotional side of this common problem. The disposable diaper, aside from being anti-aesthetic and an environmental nightmare, has very negative connotations for adults. Hugely important but somewhat taboo, this garment is symbolic of a fear of vulnerability and ageing. There is a need for comfortable protective underwear that allows the wearer to feel safe and dry, but also attractive and "normal", free from the worries of incontinence.

I approached this topic through inclusive design principles implementing an active participatory methodology. Using my family and friends as case studies, I aimed to understand this intimate human problem with a goal to inspire change through a relevant design proposal which will contribute to better quality of life and mental well-being for people suffering with incontinence and to our planet with an environmentally friendly product.



Spanning three generations: My Grandmother, Mother and myself.

PROBLEM DESCRIPTION



EU countries are experiencing steep increases in the share of elderly persons in the total population. In 2011, older persons (65 or more years old) made up approximately 17.5 % of the population. This is expected to increase to 29.5 % of the EU population by 2060.¹

As we age, we become more prone to losing muscle strength. The pelvic floor muscles are particularly prone to becoming weak, and are not commonly exercised during daily life activities. The weakening of this muscle group can lead to urinary incontinence, varying from mild to complete. The transition to losing control of one's bodily functions is difficult for both the sufferer and close family members or companions. Currently, disposable adult diapers are the most common used solution to this condition. Although these provide a practical solution, the psycho-emotional implications may be further aggravated and should not be ignored.

One in four women and one in eight men suffer from bladder weakness, resulting in mild incontinence.² This makes it as common as Hay Fever, an allergy to pollen and dust. According to the World Health Organization (WHO) this translates into 200 million people worldwide³, the equivalent of Brazil's population.

It can affect older people as a result of loss of pelvic muscle strength, or a younger person who suffers from a medical condition resulting in incontinence, for example following childbirth, an accident, cancers in or near the pelvic region, medical conditions affecting the brain such as Multiple Sclerosis or a Stroke, or even with common conditions such as diabetes and obesity. The two most common forms of mild incontinence are Stress Urinary Incontinence (SUI) and Urge Urinary Incontinence (UUC).⁴

1 [*\(http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Population_structure_and_ageing\)](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Population_structure_and_ageing)

2 *National Association for Continence*

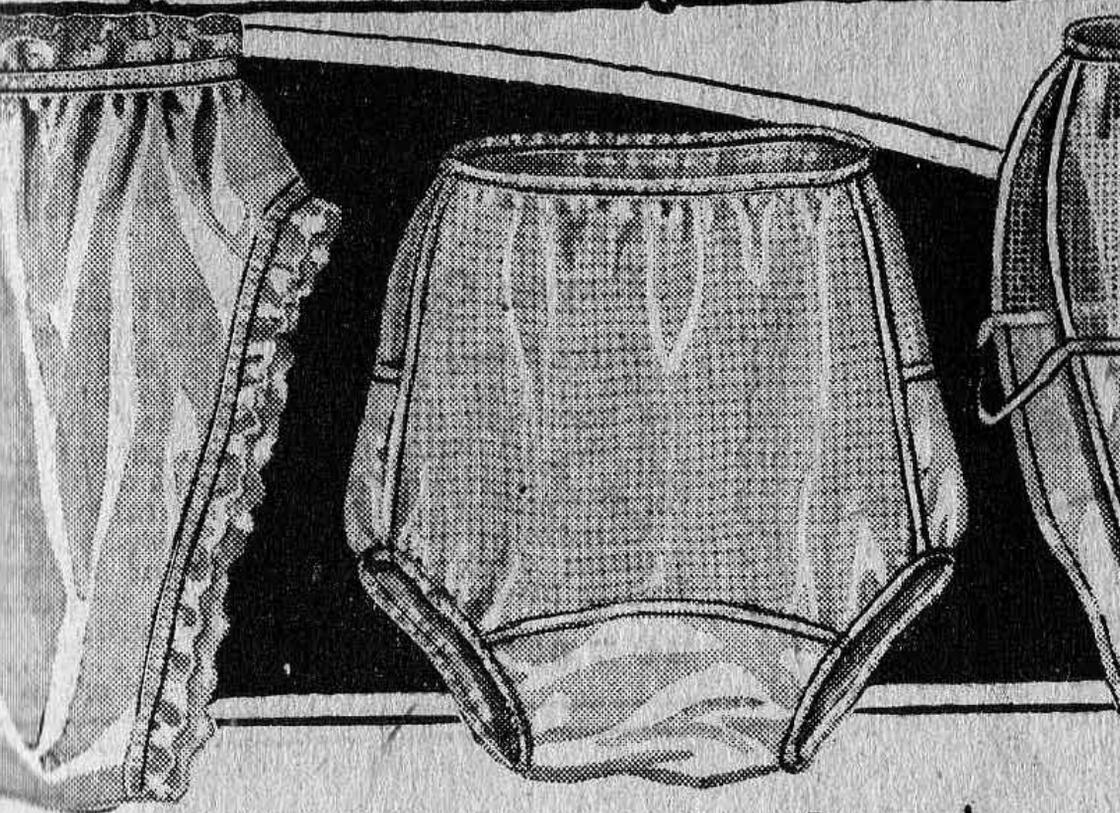
3 *National Association for Continence*

4 *National Association for Continence*

Controlling the bladder are the pelvic floor muscles, or pelvic diaphragm composed of the Levator Ani, the Coccygeus, and associated connective tissue that span the area underneath the pelvis, holding it up like a hammock. The pelvic floor is important in providing support for pelvic organs such as the bladder, intestines and uterus (in females), and in maintenance of continence as part of the urinary and anal sphincters. Exercises to strengthen these muscles to help prevent or control urinary incontinence and other pelvic floor problems have been described by Blandine Calais- Germain, Marcel Coufriez – hypopressive techniques and most famously the gynaecologist, Arnot Kegal. Kegal exercises involve repeatedly contracting and relaxing the muscles that form part of the pelvic floor. These exercises can be done anywhere, anytime, discreetly and quickly and are particularly helpful for the prevention and cure of stress incontinence. This area deserves further attention as for many people it offers the best solution of all – continence. Could we design protective underwear that would help people to remember to do their exercises?

HISTORY OF THE (DISPOSABLE) DIAPER

Sanitary Goo



er Step-In

comfort and light
are the fea-
of this Gum
er Step-In.
r ruffled edge.
um or large.
wanted.

only.....49¢
3¢ extra

Charmeuse Step-In

\$1.19 This dainty Rubberized Charmeuse and Lawn Sanitary Step-In will appeal to those who want something unusually nice. Light weight for comfort, but absolutely moisture proof, cool and comfortable. Elastic at waist.

SIZES: Medium or large.
State size wanted.

20 D 4508—
Flesh color only.....**\$1.19**
Postage, 3¢ extra

Com

58¢

and lig
Elastic

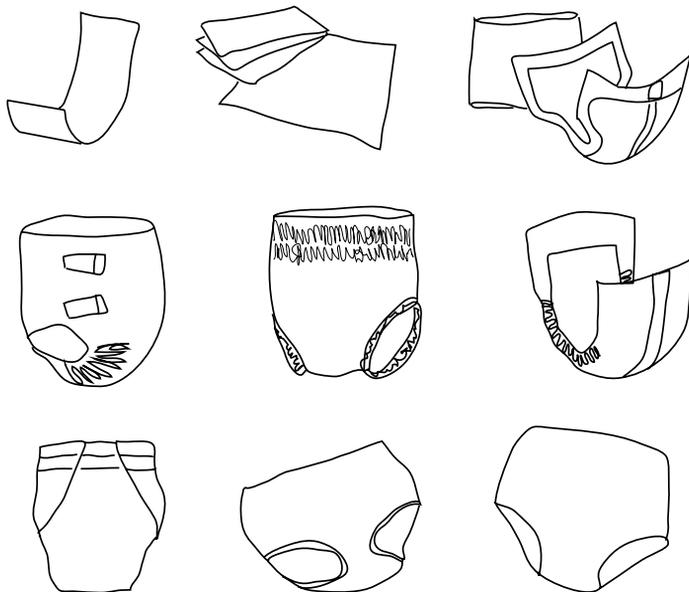
SIZE
large.

20 D
Tan
P



The diaper is a piece of absorbent material wrapped around a person's bottom and in between its legs to absorb and retain urine and faeces. 1 Primarily worn by children who are not toilet trained, they are also used by adults with incontinence or no toilet access. Originally the word diaper referred to the type of cloth with a diamond structure rather than its use.

During the 20th century the disposable diaper rapidly evolved, becoming increasingly popular after the Second World War, when mothers wanted freedom from washing diapers so that they could work and travel. A series of innovations followed suit such as the 1947 Paddi, a two part disposable pad invented by house wife Valerie Hunter Gordon. Companies such as Johnson and Johnson, Kendall, Playtex and Procter & Gamble entered the disposable diaper market and developed new features such as the double gusset or refasten able tapes. Competition amongst them led to lower prices and various design improvements.



From top left to bottom:

Beltless Undergarment, booster pad, swim diaper, disposable brief / adult diaper, waterproof brief, flat & fold, pad & pant, all in one cloth.

BRIEF HISTORY OF UNDERGARMENTS: DESIGN EVOLUTION AND ITS RELATION TO SOCIETAL CHANGE



Underwear, underclothes, undergarment are “clothing worn under clothes, typically next to the skin”. 1 Historically the function of these has ranged from protecting the body from the elements, hygiene, support of outer clothing, or for erotic use. 2

Over the years, the amount of underclothing worn by men or women has varied greatly. During the last six centuries the chief part of the women’s body covered by underclothing was the bottom half, whilst for men it was the other way around, covering the top half. This was partially related to women leading less active lives. Their outer dress was made from flimsier materials, relying instead on warmth from additional outer garments.

Underclothing also played a role in protecting the skin from the outer garment. Until about two hundred years ago, personal hygiene was not given the same importance as it has now. Body cleanliness was started by the Macaronis towards the close of the eighteenth century, and became a symbol of class distinction. 3 It is interesting to relate the evolution of undergarments to changes occurring in society over time. A wonderful example is the changing role of women in the mid 1920’s western society and how this was reflected in garment trends. After WWI, women entered the workforce and were granted the right to vote. Fighting for equality during the women’s rights movement, women began adopting a more masculine silhouette. Left behind were restrictive under-garments such as boned corsets, replaced by more comfortable bloomers, practical and curve diminishing garments embracing straight lines and flat chests. These allowed more freedom of movement; fitting in with women’s increasingly active lifestyles.

1 Oxford dictionary of English. 2010. 3rd Edition. Oxford. Oxford University Press.

2 C.Willet and Phillis Cunnington. 1992.The history of underclothes. London. Dover Publications.

3 C.Willet and Phillis Cunnington. 1992.The history of underclothes. London. Dover Publications.



The excesses of the 1980's brought us power dressing and celebrity fashion influenced by television and films. 'Back to the future' with Michael J. Fox performing in Calvin Klein briefs for example, popularized designer underwear. Societal changes influence the way in which we perceive undergarments and what we consider 'normal'.

Since the beginning of underclothing, women have always sought the perfect underwear for their sense of self. Men can also have a certain vanity about this too. What is happening in daily life inevitably will influence their choice. So what is a 'normal' undergarment now and what is it normal defined by? Does designing for 'normality' help eradicate stigma? Certainly referring back to a familiar shape would help however it would not be enough.

Normal is defined as "conforming to a standard, usual, typical or expected" ¹, or also defined as "the usual, average, typical state or condition."

Adjectives such as "standard, ordinary, customary, conventional, accustomed, common, mainstream, unexceptional" are also used to describe normality. ²

¹ Oxford dictionary of English. 2010. 3rd Edition. Oxford. Oxford University Press.

² Oxford dictionary of English. 2010. 3rd Edition. Oxford. Oxford University Press.

INCLUSIVE DESIGN, UNIVERSAL DESIGN AND DESIGN-FOR-ALL



*"Despite the obvious sense in designing accessible products, it is well known that too many products are targeted at young able-bodied users."*¹

The UK Government in the year 2000 defined inclusive design as "products, services and environments that include the needs of the widest number of consumers".² Inclusive design also aims to go "beyond older and disabled people to focus on other excluded groups to deliver mainstream solutions"³ This terminology is predominantly used in Europe, whilst in the USA and Japan the coined term is referred to as 'Universal Design'. In this case the focus is more on "disability and the built environment"⁴ influenced by the high number of Vietnam War veterans. Modelled on the Civil Rights Movement that promised 'full and equal enjoyment of goods and services' it has been a driving force in establishing American legislation regarding older and disabled people." This is also in line with ideas expressed in the book 'Inclusive design: design for the whole population'⁵ and the distinction between the European and American shift in perspective' The European model emerges as one that focuses on participation and the celebration of difference at the group level. This is distinct from the American model, where the emphasis is on the rights of the individual. For instance, 1993 was designated 'European Year of Older People; 'stressing the group rather than the individual, (...) and solidarity between generations', emphasizing the importance of intercommunity relations and social integration."⁶ I am more inclined to the European perspective of how design can connect people, especially promoting social understanding between generations. But I agree with Alice Rawsthorn's comment that "it is much more common for design to affect our lives

1 Graham Pullin. 2009. Design meets disability. Cambridge. The MIT Press.

2 Cambridge Engineering Design Center

3 <http://www.inclusivedesign.no>

4 <http://www.inclusivedesign.no>

5 Roger Coleman, Cherie Lebbon, John Clarkson, Simeon Keates. 2003. Inclusive Design: Design for the whole population. London. Springer-Verlag

6 Roger Coleman, Cherie Lebbon, John Clarkson, Simeon Keates. 2003. Inclusive Design: Design for the whole population. London. Springer-Verlag



Bridget Jones Diary, undecided between leopard print or shapewear

without us noticing that it has done so, which can make it even harder for us to address the problems caused by dysfunctional design.”¹

It is especially difficult to realize when you are young and able-bodied, becoming only aware of difficulty when you lose some essential function, such as close vision or continence. Participatory methods are especially useful to bridge the gap and help relate personally to the problems in question.

Perhaps the first step is done simply by noticing and raising awareness. It is consistent that Inclusive Design became a bigger priority after two World Wars and the Vietnam War when a larger proportion of people were affected by a disability or condition making them less able. However, is it possible to design for all, or must one choose?

“Inappropriately defining people in terms of their ability also runs the risk of stereotyping populations of people who share a particular disability, but may otherwise be as diverse as the population as a whole.”² Where do you draw the line? Perhaps best is the approach of Resonant Design -“design intended to address the needs of some people with a particular disability and other people without that disability but perhaps finding themselves in a particular circumstances.”³ By connecting both groups, stigmatizing becomes less of a risk, which I would say is one of the main deterrents to wanting to design according to inclusive principals now.

The stigma surrounding a living aid

Two inspiring athletes campaigning for further reflection on our current approach to design for disability and prosthetic innovation are Aimee Mullins and Hugh Herr.

This section will examine their personal battles with the stigma surrounding the living aid with examples of how we can begin to re-think

1 Alice Rawsthorn. 2013. Hello World. London. Penguin Books

2 Graham Pullin. 2009. Design meets disability. Cambridge. The MIT Press.

3 Graham Pullin. 2009. Design meets disability. Cambridge. The MIT Press.



Hugh Herr

its position within society to eliminate stigmas.

Aimee was born with the medical condition Fibular Hemimelia and had both her lower legs amputated on her first birthday. She describes her views on her disability as “putting on my legs seemed no different from a friend putting in contact lenses”¹. She now owns a collection of various prosthetic legs used on different occasions and made from such diverse materials as carved wood or carbon fibre. However her collection was not always as varied as in her description of one of her earlier pairs “The cosmetic covering was made from a horrible dense foam. And they were unisex, with two colour options: ‘Caucasian’ and ‘Not’. ‘Caucasian’ was the ugliest shade of peach you could have ever seen.”² This experience is similar to the choice of adult diapers now on offer. They are unisex in approach despite each gender having clear anatomical differences. Aimee was encouraged to accept what was offered instead of demanding more than function, as she says “I remember someone saying: ‘It’s really a shame that you care what you look like, Aimee. You’re an amputee, you just need to accept that.’ To me, that statement about ‘acceptance’ was really shocking. I wasn’t going to be embarrassed or ashamed for demanding more than function from prosthetics.”³ Today she is an icon of shifting perspective on prosthetic innovation and the view that one can express themselves through an aid as an accessory and not only as a functional object.

Hugh Herr, after losing both his lower legs in a teenage climbing accident challenged the use of prosthetics in a different way. Undeterred by the accident he went back to climbing and designed a pair of prosthetics that improved his climbing, allowing him to reach higher points difficult to reach naturally. Pity over his condition then turned to complaint from his fellow climbers, who labelled it unfair. This change in

1 Alice Rawsthorn. 2013. Hello World. London. Penguin Books

2 Alice Rawsthorn. 2013. Hello World. London. Penguin Books

3 Alice Rawsthorn. 2013. Hello World. London. Penguin Books



Aimee Mullins prosthetics

attitude towards a disability is encouraging because it challenges our pre-conceived ideas of what is normal. "So effective are his artificial climbing limbs that some of the fellow free climbers who had pitied him after his accident were soon calling for him to be banned from entering competitions because of his 'unfair advantage'.¹ In this case prosthetics are seen as enhancers rather than disablers.

An interesting conflict with the use of inclusive principles in a luxury hotel was brought up in one of my recorded interviews with the Buades family. While discussing disability aids, they recalled a romantic weekend away together at a gastro hotel in the Majorcan countryside. Their room was designed for accessibility by all and included the standard requirements such as handles in the bathroom and a ramp. Although they appreciated that this was available for those who need it, they also felt that the atmosphere lost a bit of 'glamour' and somehow reduced the romanticism of the weekend for them. Sadly the presence of the handles and ramps was somewhat repulsive, reminding them of hospitals and nursing homes. This inclusive design distinguished itself as specific to a type of person, hence distinguishing and dividing very clearly an able and disabled person. A disabled person has no choice whether to use aids or not, therefore less priority is placed on the design of how it looks and feels to use it.

Ideally these aids would be designed to be discreet or beautiful features and enhance (or at least not subtract from) the enjoyment of the room for everyone. This is where the involvement of a designer should be more present, to avoid stigmatizing Inclusive design and end up spoiling the experience for some users.

These case studies highlight a still strong and present stigma perceived from objects aiding the less-abled in daily living situations. It is encouraging to see that this perception is being slowly though successfully challenged, especially among high profile athletes within the

1 Alice Rawsthorn. 2013. Hello World. London. Penguin Books



Exclusive bathroom

context of sport. These examples are inspiring because they emphasize how important it is to design not only for function but also to incorporate the emotional effect of using an aid.

Connecting with a living aid through personalization

At the Elderly Care Show in Birmingham a woman caught my attention with a crutch decorated with bright and sparkly fabric, a nice example of how personalization of an aid can help a user connect positively with it. In this section I will discuss the downsides of universal design, or 'designing for all', and how personalization of an aid can help to improve the outcome.

I spoke to the woman about her customization and she explained that she had a different cover for different occasions, and how they matched her handbags. She was very proud of her creation and it was refreshing to see, especially within the Elderly Care Show where most objects were designed only for function with no emotion or aesthetic in mind.

On the one hand it was inspiring because given the lack of emotion found in the products, it felt like there was still a lot to contribute within this industry. However it was also saddening to see that this area has not provoked much interest from designers. I believe this relates more to awareness than interest. Meeting this woman reinforced how important it is to design for how it feels to use an aid and how personalization can help.

Another example of aid customization is Sclavi's Rolling Chair by Sergio Calatroni Artroom. He decorated the wheelchair with colourful tape and a textile patchwork seat making it a piece of art, and renamed it a rolling chair. An art director condemned to a wheelchair, he found an alternative way to express himself and feel more connected to the aid. Even the re-naming of the object is refreshing, helping to view it in a new light. Aesthetically should "individuality be part of the design brief, and what should we mean by this?



Crutch customization at the Elderly Care Show

Should it be individuality for the sake of differentiation, or something relating to the existing identity of the person sitting and living in that chair?"¹

These case studies highlight the downside of designing for all, having a negative effect of not feeling identified with this object; hence one needs to resort to personalization to connect. Despite the positive intention of designing for varying needs, the result is a conflict, forgetting individual tastes and emotions and ending up with basic function but not pleasing anyone.

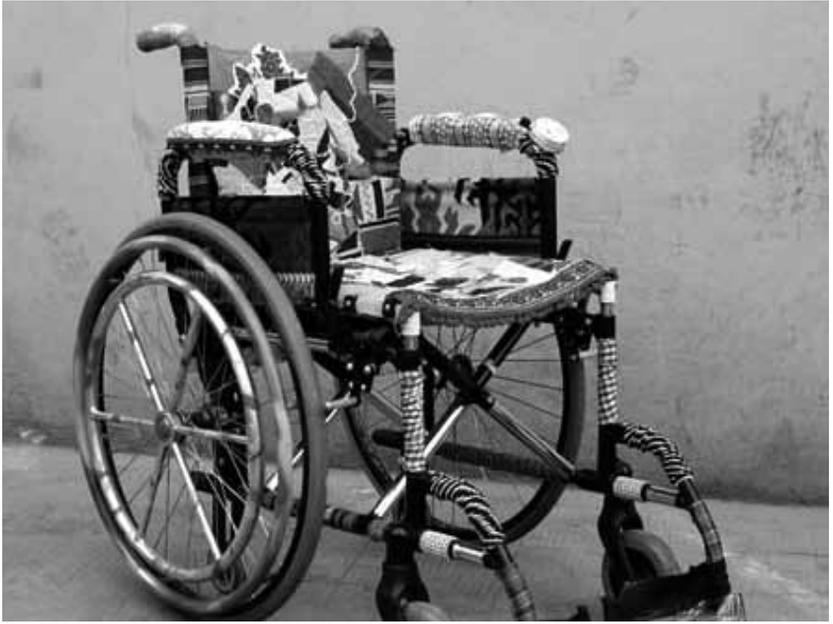
Disguised inclusive design

What about if we became better at disguising inclusive objects? Following are some examples of objects that that benefit a wide population, but at first glance would not necessarily be shining examples of inclusive design. The football's distinctive black and white design is one of these. Introduced in 1968 for the European Football Championships to aid visibility on black and white television, "the Telstar is a glowing example of design's ability to enhance our lives, both by solving a practical problem and improving our sense of well-being. By enabling many millions of soccer fans all over the world to follow the progress of the World cup games clearly."² This is a fantastic example of how changing some design elements can make a design more inclusive. By making the ball easier to see and follow, it helped many more people enjoy watching the game. This humble design quickly became taken for granted, forming part of everyday life.

Another example are the Nabee compression socks, whose founder noticed whilst working in the hospitals, that nurses wearing compression socks would wear a decorative sock on top. With this insight he began designing compression socks that looked like regular socks, making them more discreet and appropriated for every day.

¹ Graham Pullin. 2009. Design meets disability. Cambridge. The MIT Press.

² Alice Rawsthorn. 2013. Hello World. London. Penguin Books



ScIavi's Rolling Chair by Sergio Calatroni

Hovding inflatable helmets by Terese Alstin and Anna Haupt understood discreetness and 'normality' as an important element of their helmets for cyclists. They noticed that people did not like to wear helmets, finding them unfashionable and interfering with their hair. So they designed an airbag helmet that inflated upon impact, yet appeared to be a collar during everyday use. Maartje Steenkamp Children's high chair evolves with the growing child. This is a wonderful example of inclusive design which considers the changing needs of the user, and how the object can grow together with the child in response to new needs.

On the other hand, a collection of chairs and mobile side tables designed by Lanzavecchia + Wai as aids for the elderly, although attractive, are not very inspiring examples of inclusive design, given that it is still very much an elderly product, focused on a defined age and ability of the user. But is this actually better?

A clear model for whom it is targeted? Perhaps it could go the direction of Herman Miller's Aeron chair designed for the elderly but now a staple boardroom trophy. According to Justin McQuirk it falls into the 'ultra mundane' category where "Belonging to the realm of hyper-performance, they test the limits of our understanding. Where we fail, they succeed. They are the reification of all that we wish we could do, of our longing to perform."¹

Most of these examples reflect a clear understanding of the specific shortcoming of the original version - how and why people did not want to use it. Once these key motivations were understood, it became easier to propose another approach or adapt the original design to suit more users.

De-stigmatizing communication

Hard to forget is the scene in the 2001 film Bridget Jones Diary where Bridget deliberates over wearing a pair of small 'sexy' leopard print underwear or large nude colour slimming pair. Practical but

¹ Justin McQuirk. Ultramundane. Domusweb.it



Football as an example of inclusive design

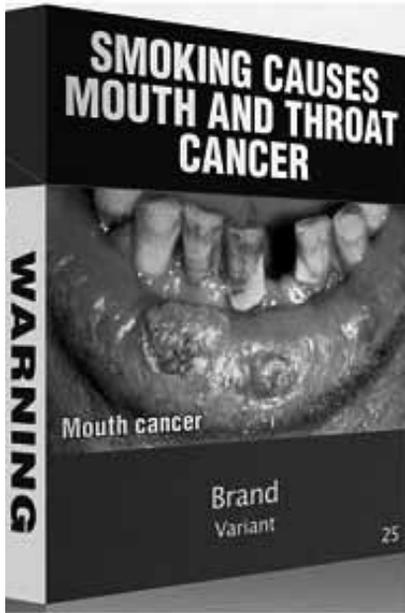
unattractive she decides to go for the large pair, cementing the stigma surrounding this type of design as 'granny underwear'.

However look back forty years and this size and style of underwear was considered the standard. What shapes our perception of a garment or object? This section will look at the implications of product or service presentation and communication, and how it can be used to de-stigmatize.

"See potential, not disability" is a campaign for the Al Noor Training Centre, a school for children with special needs in Dubai. With no budget they decided to take advantage of the globally recognizable disability symbol of a person in a wheelchair and designed a series of stickers that challenged our perception of a disabled person. On the stickers they turned the logo of a person in a wheelchair into visuals of magicians, basketball players, singers or chefs among others. The city became the billboard wherever there were labels for parking, seating or disabled access. This is a great example of a de-stigmatizing campaign.

On the other hand, sometimes the purpose is to stigmatize, as in the case of the Australian government and the de-glamorizing of tobacco. After researching use of colour in packaging, they found that olive green was the most unappealing colour. In 2012 the government introduced measures requiring all tobacco packaging to be coloured olive green, to include images of diseases caused, and to strip the packaging of branding, including the name in small print. Tobacco companies fought back and Nicola Roxon, Australia's health and ageing minister responded "Let there be no mistake, big tobacco is fighting against the government for one very simple reason – because it knows, as we do, that plain packaging will work".¹

1 <http://www.telegraph.co.uk/> Philip Morris sues Australian government over tobacco packaging



In the context of de-stigmatizing incontinence underwear, Shreddies is one of the only examples found where they present their product in a photo shoot depicting two young and slim individuals, however the underwear style is still large and white and not really appealing to younger users or even many otherwise able-bodied older people. Understanding the core issue and its stigma is key to addressing it cleverly through communication. As seen in the examples above this can be used both to an advantage or disadvantage.



Shreddies underwear

**DESCRIPTION OF PARTICIPATORY METHODS USED AND HOW
THE TOPIC WAS ADDRESSED**



Handwritten notes on a piece of paper, including the words "CITROBUS", "ACTIVITY", and "To this is the result?".

CITROBUS
ACTIVITY
To this is the result?

METHODS USED TO GAIN INSIGHT INTO THE TOPIC

1. Interviews , group or individual with or without prepared questions

Who was interviewed:

- a) Family and friends
- b) Strangers – at trade shows, elderly homes, workshops
- c) Design colleagues
- d) Elderly care and health professionals.

2. Active observation

- a) in my grandparent's homes
- b) volunteering at an elderly home.

3. Online, anonymous observation in forums and discussion groups

4. Reflection and interpretation of my observations and interviews in:

- a) A reflective diary
- b) A private blog
- c) Story telling by video

5. Personal experience as if a person with incontinence –buying, wearing, and using diapers.

All methods for designing need to meet technical and functional requirements, but it is equally important to consider the user requirements to ensure that the thing being designed meets the needs of the end user. Participatory methods involve user collaboration and consultation, requiring close interaction between designers and users. To empathise with a user group and access their experience we need to listen, interpret what they say, watch what people do, observe what they use, find out what they know, and try to understand what they feel and wish for.

An example of how we can achieve this is described in IDEO's Tim Brown's book, *Change by Design* where he describes the team's experience while re-designing the customer experience at the emergency room of the SSM DePaul Health Centre in Saint Louis in 2000. Going on an undercover mission simulating a foot injury, team member Kristian Simsarian set out to document the average emergency room experience, from checking in to waiting and being wheeled around and eventually discharged. This he captured on camera and on return from the undercover mission the unedited video was reviewed.

"The crushing tedium of the video thrust the design team into Kristian's – and, by extension, the patients – experience of the opacity of the hospital process.

It triggered in each of them the mix of boredom and anxiety that comes with being in a situation in which one feels lost, uninformed, and not in control."¹ Graham Pullin's says that we generally approach design for disability "as an exercise in problem solving... in common with the clinical tradition of diagnosis and treatment." He suggests that thinking outside the box and adopting quite different approaches would be a better way to find "valuable new directions" And he suggests that within inclusive and universal design there are many participatory methods that can be used. Bas Raijmakers mapped inclusive methods (with a strong participatory undercurrent) used for their different informative qualities at various stages within a project.

Inspired by these individuals, I chose to include external participation in my methodology from the beginning. I used different participatory activities to help me gain insight on the topic and empathize better with the people I was designing for. Each activity explored participation and interaction with users in a different way, and together contributed to my personal understanding of aging and incontinence, helping me to come up with a more relevant design proposal.

¹ Graham Pullin. 2009. *Design meets disability*. Cambridge. The MIT Press.

Interview family & friends individually or as a group

The process began by interviewing my Dutch Grandfather and his partner at their home in The Netherlands, naming it Case Study #1: Opa and Riet. Previous to the visit there was no explanation regarding the intention to interview, in order to discourage any advanced preparation on their part. After lunch recording tools were set up and a 'recorded chat' took place without prepared questions.

Further interviews in my hometown of Mallorca (Spain) with family and friends were initiated in a different way. Questions were prepared within themes such as autonomy, mobility, home, social activities and technology acting as a wide bullet point guide for the conversation. A total of twelve people from various age groups (ranging from 25-65) were interviewed on camera on these sub-themes. Initially believing that interviewing friends and family would be easier than strangers, this element of the methodology was surprising. Formal tools such as a recording video camera or prepared questions influenced this.

Attempting to encourage an informal tone to capture the 'real feeling' I challenged interviewees to think of the interview as a recorded chat. Allowing the conversation to drift resulted in very long recordings and producing many hours of footage. Although interesting to revisit the body language, the footage was tedious to sift through and ultimately the enlightening insights stood out in memory. Memory essentially became the method of editing. Memorable points and common threads connected the conversations. What worked especially well was to interview a group of individuals who knew each other well, and would correct, elaborate or challenge each other's answers. This created a discussion in contrast to interviewing an individual one on one.



Interviews undertaken in Palma de Mallorca, Spain



Active observation case studies:

For this methodology I was influenced greatly by the book "Change by Design", by Tim Brown and especially the following excerpts: "The mission of design thinking is to translate observations into insights and insights into products and services that will improve lives" (...) "Behaviours represent different strategies for coping with the confusing, complex, and contradictory world in which they live." "We build these bridges of insight through empathy, the effort to see the world through the eyes of others, understand the world through their experiences, and feel the world through their emotions."¹ Another method employed during the early stages of the project research was as an observer and active participant in my Grandparents homes. This took place in both The Netherlands and in the United States, as per my parent's respective countries of origin.

Observations were documented predominantly on camera, finding the smart phone camera particularly useful for quickly documenting small moments, when the regular camera would be obtrusive or just too slow. I archived my observations online in a private blog and reflected upon them in a diary. Small details of daily living that I found particularly interesting were documented with photos, analysed and catalogued on my computer. They provide mainly illustrative examples are taken from my own experience.

Volunteering at Zuid Zorg

To keep in touch with the elderly whilst no longer able to visit my grandparents I volunteered once a week at the activity centre Vrienden van de Thuis Zorg in Eindhoven. Initially it was tricky initiating conversation with my limited Dutch, and I doubted that this experience would contribute greatly to my research. However I enjoyed the visit and taking time out to spend time with the group of women making cards.

¹ Tim Brown. 2009. Change by Design: How Design thinking transforms organizations and inspired innovation. New York. HarperCollins



Over time I found that by making cards with the elderly residents became a good medium to communicate. Choosing colours, decorative card details and discussing different card options helped to create a connection. Occasionally I would bring in a current protective underwear prototype, which would spark some discussion amongst the women. Further on I will discuss how beneficial this experience was to understanding small details of their daily life and struggles.

CRISP Grey but Mobile 'Empathic Design' workshop

A six week workshop organized by the Grey but Mobile CRISP research platform at Design Academy Eindhoven bringing design students from different classes together to discuss how the Dutch elderly use the public transport. Paired up with another student we visited and interviewed an elderly Dutch couple Theo and Gerrie and produced three mini video stories that identified three insights on their use and view of the public transport living in a rural community. This culminated in a workshop where each pair shared their three short films portraying the individual use or view of the public transport within a certain context. As a group various different profiles of individuals were covered and generated insight on different values or downfalls of the public transport. This concluding workshop took place at a local elderly home where external collaborators with varied responsibilities within the care industry were invited to take part. During the afternoon, the group was diverted into teams exploring one insight and how it could be made a reality.

Exercise in video editing

Editing video footage into a story as a method of gaining insight. When deciding on what story to tell, editing becomes a reflective process to further understanding and communicating a personal perspective on the topic.



Visiting trade shows and researching existing products

In order to gain a better insight into the care industry I visited the Birmingham Care and Dementia Show in November 2013. A novice to the industry, the trade show was a good starting point to meet and speak to people involved. I also visited the Material Experience in January 2014 in order to research potential materials for the design proposal.

Reading user comments and following discussions on online forums

With the anonymity provided by the internet, this medium can be especially useful when researching and designing for an intimate garment, where it is difficult to find users willing to speak openly. Online forums and discussions can prove frank and informative regarding small details, which in turn can further help inform the design and flag up aspects that had not been thought of.



Birmingham Elderly Care Show 2013

METHODS OF EMPATHISING EMOTIONALLY WITH USERS DIFFICULTY

As a way to truly empathize and connect with the user dealing with a new condition of urine loss, the method of re-enacting an assumed users experience was trialled.

Buying an adult diaper

The process of buying an adult diaper was surprising difficult and undignified. It began with trying to find and buy a disposable adult diaper in The Netherlands. With no luck finding this product in the supermarket, the next stop was the pharmacy, followed by calling several adult diaper companies such as TENA Lady amongst others. A condition of incontinence was explained over the telephone to a company representative, which then proceeded to send by mail several adult diaper samples. During the next month various samples were received in the post.

Next I tried the pharmacy, there was a queue of people seated on chairs provided along the wall in hearing distance of the conversation of the customer with the pharmacist. I wondered what this experience would be like for one attempting to buy a diaper for the first time. At my turn I asked the pharmacist for an adult diaper. She was not convinced it was for my use and questioned if it was for somebody else. I told her it was indeed for me, which caused some confusion. Eventually and reluctantly I explained the project and how I was buying it to try myself given I was designing for it. I was given a few samples to trial. However through this first-hand experience I realised what an ordeal this experience could be for a person suffering from this problem and having to deal with the embarrassment of this process.

Wearing an adult diaper and recording the experience through interview

After receiving about ten different samples of adult diapers in the post two men and two women (including myself) were invited to choose,

wear and test (by urinating in) one diaper design whilst recording this experience on film. It was important to include the participation of at least two men and two women to compare the experience of each gender. During the experience the individuals interviewed each other by asking questions such as, "how does it feel to wear to wear it?" or "can you see it through my clothing?" These questions were reactive and not prepared. The experience took place over the course of two interviews, firstly the women's and secondly the men's. Initiating the experiment was a plastic bag full of various products.

The individual was then asked to choose a product and explain why they had chosen the specific one. As both individuals tried on the respective product the 'recorded interview' began. This experience ended once the diaper had been urinated in and the individual took it off. This video can be watched at <https://vimeo.com/82954380>

Discussion group

Once the idea had been implemented with a series of prototypes, a discussion group of women between fifty and sixty-five was organized. The object of this was to explore the attitude toward wearing protective underwear among older but still very active women. What were their design requirements, and limits for using this kind of underwear? The discussion was organized as a casual evening gathering amongst friends with food and wine. The prototypes were put on the table to prompt discussion on various aspects of the design and the perceived experience of using them.

**DISCUSSION ON METHODS USED AND HOW THEY HELPED
RE-FRAME THE APPROACH**

Including different forms of participation helped address and understand key values later tackled in the design. This section will discuss vital insights from the various participatory methods trialed and how the interactions helped re-frame my approach to designing an intimate healthcare garment. This will be discussed in two parts, beginning with a discussion on the methods used to gain insight into the topic followed by the methods of empathizing emotionally with the user's difficulty.

Jane Fulton Suri a psychologist and pioneer of human factors refers to "the myriad of thoughtless acts people perform throughout the day: the shopkeeper who uses a hammer as a doorstop; the office worker who sticks identifying labels onto the jungle of computer cables under his desk." (...)

"Their actual behaviors, however, can provide us with invaluable clues about their range of unmet needs."¹ These thoughtless acts can be manifested in an observation in-situ or as I found, a story in conversation.

One of these moments came during a group interview with the Buades family, whilst discussing bathroom aids. They told a story about an occasion when their grandmother Pilar Buades rejected an aiding shower stool. It began with Pilar's grandchild, Lola Buades, needing a desk chair. In conversation with her grandmother she mentioned this need, who in turn gave her the aiding shower chair. This amused and slightly baffled Lola because the stool was clearly an aiding shower chair, not a desk chair. This sparked a discussion as to why she did not want to use the shower stool. Why are some areas of ageing easier to accept help than others, and is it necessary that an aid must look like an aid?

¹ Tim Brown. 2009. *Change by Design: How Design thinking transforms organizations and inspired innovation*. New York. HarperCollins

The bathroom and intimate sphere emerged as a particularly difficult area to come to terms with ageing. The discussions resulting from group interviews, where individuals challenged each other on their answers, were especially effective at highlighting key questions. But how do you recognize a small detail of daily life as an insight?

As Charles Kettering stated 'a problem well stated is a problem half solved'. Including group participation in interviews helped reach the crux.

Indirect participation through observation in the home environment was initially a strange experience given it involved analysing the lifestyle of my own family and grandparents. However it had the benefit of gaining access to private details of everyday life that do not come out in conversation. It was difficult to get into the role of observer in a familiar environment but knowing the person and having a before and after reference point, was very helpful, particularly to identify unusual habits or responses.

Indirect participation whilst volunteering at the elderly activity centre Vrienden van de Thuiszorg, gave me an opportunity to continue as an observer. At one point I brought in a red prototype design, which I had not thought to be provocative. I put it on the table and the first reaction was "Oh, definitely not in red, only white or black". For research purposes, it made me realise the importance of including a 'provocative' detail, as from this it was possible to elicit a reaction and gain more information. If I had brought in white underwear, this simply would have gotten approval. Indirect participation in a familiar environment may have the added benefits of access and hence insight into private details, but also can be tricky to remain objective when there is a personal connection. On the other hand by simply taking part in a group activity with strangers, involving a design context (making cards with elderly ladies in a home), you are able to casually observe and pick up those small detail of daily life that provide insight.

Understanding concerns too well can have the detrimental effect of limiting ones perspective or point of view. I specifically encountered this during the organized discussion with a group of women between the ages of 50 and 65 years of age. It was a fantastic opportunity to speak to a group of women openly about this issue but accepting their need to hide any evidence of incontinence led me to accept this as the way to design. During the discussion it was made clear that although incontinence should be considered normal they do not want to make a statement. Instead they would like to hide the issue. This was taken onboard but challenged the language of the design proposal.

In trying to change a perspective on the normality of incontinence, should the design as a result allow or persuade the user to make statement? By trying to appear discreet as regular underwear, yet with an extra protective function did it risk not challenging our current views on incontinence? An interesting alternative could be a design proposal which provokes a good habit, such as a reminder to do the recommended pelvic exercises - a 'trigger design'. This could be compared to encouraging teeth brushing as an activity to prevent and relieve tooth decay and gum disease. Proposing a trigger rather than an obvious statement could be a more inclusive option – involving people with and without incontinence and would certainly be more favoured among younger users than making an obvious statement.

A vital step in my research was being an active participant, trying to replicate the experience of living with incontinence. This is where I could attempt to understand what users really feel and wish for. Experiencing the process of sourcing, buying, wearing and disposing of an adult diaper was a simple way to empathize with a user. This experience illustrated how the positioning of this product within a medical context contributed to its stigmatization. To challenge its perception, the whole experience of acquiring a protective garment needs to be re-designed.

My embarrassing experience at the pharmacy let me feel just how uncomfortable this process is for people with incontinence, and emphasized the need for uncomplicated, anonymous shopping for this product, preferably within the context of shopping for any other adult underwear.

Re-creating tools to empathise with a user's physical experience was explored by Produkt + Projekt in the GERT age simulation suit, that replicates ailments the elderly can be subject to, such as cataracts to lower body paralysis. Aiming to communicate an experience graphically was also explored by IDEO in the Lilly posters, to be placed in laboratories in order to remind of patient needs whilst developing drugs. In this case it involved re-enacting a procedural experience. It made me question if a discreet sales method also contributed to its negative connotation. If it were more visible would it become more 'normal'? Putting yourself in the position you are designing for is a direct and active way to connect with the people you are designing for. It is a simple yet very effective method to empathise with the user.

Overall this section highlights the key moments of insight using methods of active and passive participation. These predominantly helped to understand the topic from distinct angles such as the user experience, emotional needs and practical application. As a designer, I feel it especially relevant to try to experience the context oneself. This also helps gain trust and credibility from users. To others in the field of designing living aids this methodology is especially useful for understanding and addressing the emotional needs of people. This insight can then be translated in the communication of the topic and language of the design proposal.

Participating in the CRISP 'Grey but Mobile' workshop highlighted the importance of how to communicate an insight gained, specifically through video. Taking part in this workshop helped exercise ways to translate and focus a small insight into a short story; that was then shareable and would help others relate to the difficulty.

DESIGNING PROTECTIVE UNDERWEAR



“When I design, I don’t consider the technical or commercial parameters so much as the desire for a dream that humans have attempted to project onto an object.”

Philip Starck’s commentary on this design consideration made me think about the implication of choosing to design a daily living aid. Although a well-intended aim to alleviate a common and human condition through design, it has the limitation that nobody dreams of being confronted with losing control over their body at any stage. This is not only an issue related to what we perceive as socially normal, but also of personal autonomy. Translating these thoughts into a design proposal that could also function as washable protective underwear were the challenges faced during the development of the materialising the concept.

The design proposal experimentation and research was therefore divided into:

- Practical (material) research and how to make the protective underwear textile absorb – wash – release – re-use fluid
- Language of the design proposal and how to challenge the current perception, position and context of the adult diaper.
- Experience of wearing, purchasing, discussing and receiving this product.

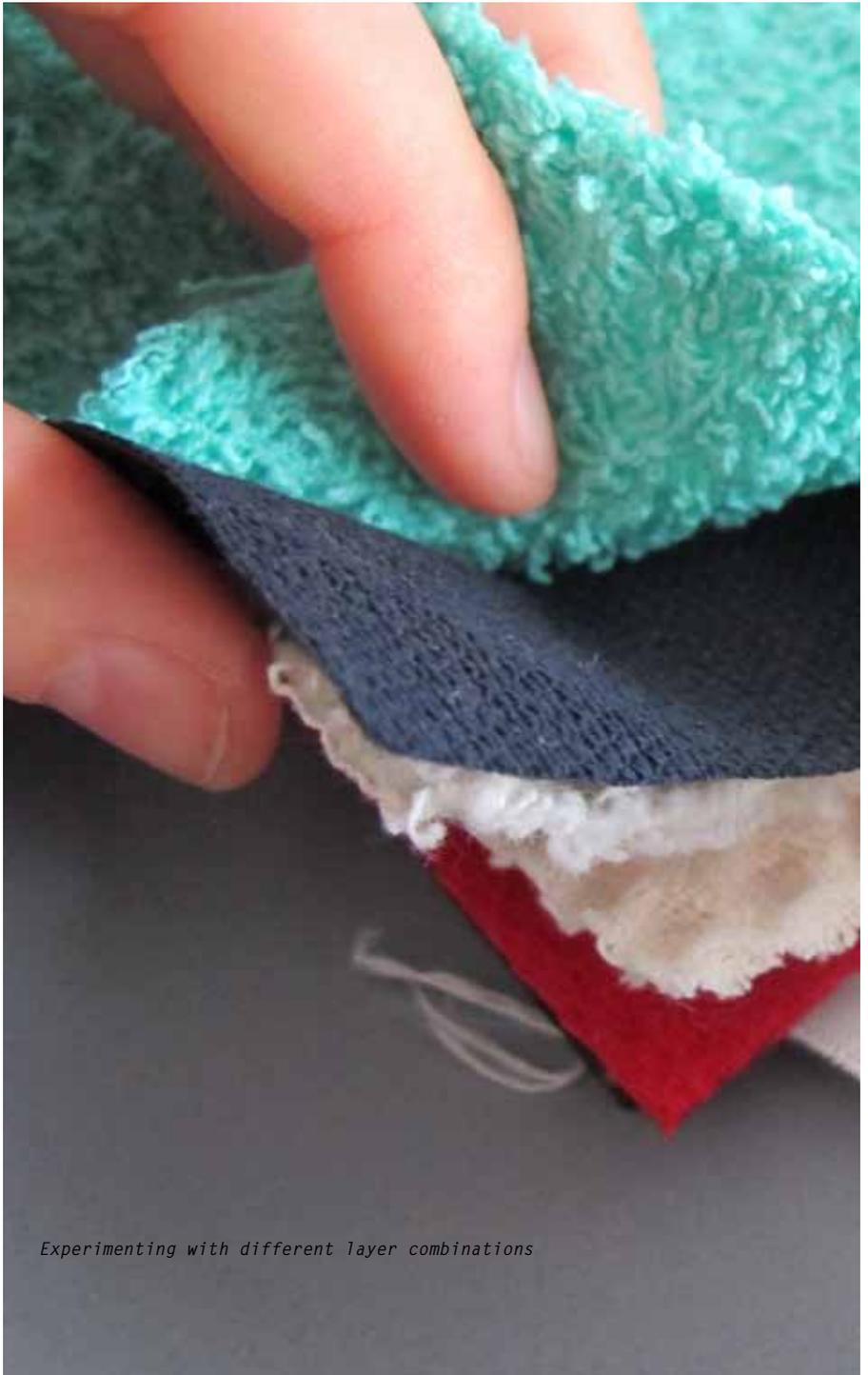
Material experimentation

Material testing involved exploring a large range of available fabrics, yarns, fibres, non-woven’s, textile structures and treated fabrics. Listed below are the main materials tested:

Non-woven: Varying weight range from 80-150g of non-woven with high percentage (80%) of viscose and 20% polypropylene.

Natural fibres: Cotton, wool, camel skin.

Synthetic fibres: Microfiber, flannel, neoprene 1.5mm & 3mm, nylon, synthetic skin, polyamide two layer laminate with lycra.



Experimenting with different layer combinations

Various textile structures: Waffle pique, padded knit, satin, corduroy, terry towelling, various jersey weights.

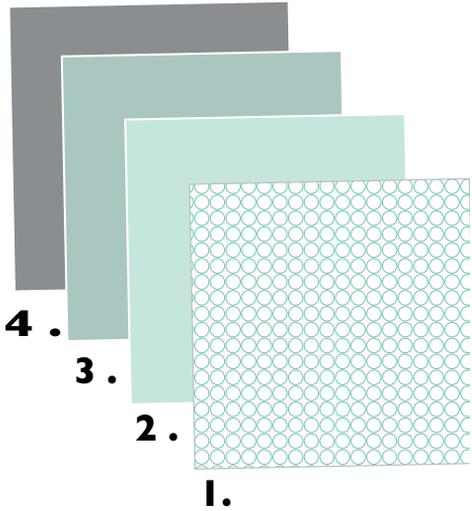
Treated fabrics: cordura jersey, nylon PU coated, stretch polyamide with coolmax

The material experimentation was lengthy and involved many trial and errors of existing material combinations. It began with first understanding the function of each layer in the disposable diaper to then be interpreted as a textile. The function of the layers were established as:

- Contact with body and removal of moisture from the textile surface.
- Transport of the fluid to the storage layer
- Storage of the fluid
- Waterproof layer preventing fluid from soiling external clothing.

Once the layers were understood the materials used in textile baby diapers were researched, given their more widespread development than adult diapers. During this period it was helpful to meet with Katje Katoen, a textile baby diaper distributor in The Netherlands with more than twenty years experience in the industry. Here we primarily discussed practical possibilities and scenarios by making reference to existing designs, their combinations and systems of closure and absorption. Surprisingly stigma was also found to be an issue within the textile baby diaper industry, although in this case associated with washing workload.

Materials that worked especially well absorbing fluid were synthetics such as viscose and microfiber. These contrasted considerably with natural materials such as cotton and wool. It was primarily most apparent in the absorption speed. Whilst the synthetics would absorb water instantly as it touched the surface of the fabric; natural materials would not. Instead the droplet sat on the surface of the fabric for at least thirty seconds, in which case if it was not absorbed it would overflow on the edges hence becoming unsatisfactory for this application. Swift absorption became key, to remove the moisture from the surface and transport it onwards to the storage layer.



4. WATERPROOF LAYER

Waterproof finish or fabric

3. STORAGE LAYER

High storage capacity

- * Non woven electro spun yarn?
- * Superabsorbent yarn

2. TRANSPORT LAYER

Transport & disperse fluid
Fibers swell horizontally

- * Hollow yarns
- * Microfiber
- * Non woven viscose

1. TOP LAYER

Very fast fluid transport
Remove moisture
Comfortable
Synthetic yarn

- * Microfiber
- * Viscose
- * Modal
- * Lyocell

Function of the layers

Given this disparity in performance synthetics became a more suitable option. Nonwovens, often found in kitchens in the form of a yellow or other bright coloured cleaning cloth became an interesting option for their high absorption quality and high temperature washing possibilities. The potential of this material was most suited to the storage layer of the protective underwear due to its unpleasant touch and loss of quality and absorption due to friction.

Another important step during the practical and technical exploration of the project came in the form of the super absorbent fibre OASIS. In industry this fibre is used in varying proportions to form a yarn, mixed with a strengthening fibre such as polyester.

Typical applications of this super absorbent yarn are in combination with electrical cables, for safety against the elements. Or as a cooling system within a food cooler, high performance sports gear or within medical applications to absorb fluid during operations.

What makes the OASIS fibre interesting for this application is that it is medically approved and is not a one way system, but re-usable if the gel is preserved. In theory washable. In the form of a fibre it becomes easier to integrate whilst developing your own textile, in contrast with the non-woven which cannot be integrated within traditional development of the textile. Early tests have so far shown it can be re-used but given a gel forms around the yarn the gel needs to be isolated, in order to have no contact with the body or be washed away.

Although synthetic materials worked especially well, they still did not work as well as the irreversible chemical reaction that makes the disposable diaper work so well. There is a high storage of water, however it can be compared to a sponge, where if pressured slightly the water is released. The maximum point reached, 100ml worked but not well. This did not occur within the super absorbent fibres as they became a gel. However these technical complications became an important guiding limitation and provided the framework for the design. Based on this realisation



OASIS absorbing fibre

the design and concept was adapted to be tackled within absorption levels catering to a mild level of urinary incontinence, more commonly present in younger women with the goal to increase absorption and scope in the future.

Although technical these created a useful framework to begin with and guided the design aesthetic towards a younger woman. The nature of the product meant it was also important for it to fit and work well by absorbing the fluid comfortably. By aiming to be washable and re-used this adds technical difficulty and proposes challenging scenarios such as maybe having to carry a used brief or pad. Given the different needs, how do you balance being inclusive yet not overdesigning its function?

Commercial tension: Approaching and discussing the project with industry

Proposing a mainstream product that involved issues too complex to be tackled alone, help was sought from industry to try to resolve some of the technical issues. Approaching industry was a good exercise in itself as it created an extra push each week, and was helpful in gaining insight into other possible technologies to look into, however it also created a tension between the concept and utopia of the project in relationship to the commercial avenue. This could be frustrating at times and could create conflict between the research and commercial avenues of the project. As for example questions such as the cost of the prototype, specific target or competitor strategies became points of interest for collaborators, rather than the concept in it self or at times the technical innovations. On the other hand, positive notes included having the time to address some of the questions or obstacles raised, or being made aware of potential pitfalls and understanding the context of the system. Gaps in the concept were highlighted in the context of reality and it was necessary to learn to explain the project in different ways according to the background or interests of the person. Put simply, meeting with external collaborations was a reality check; where practicalities seemed to become more



Artofill absorbing yarn factory

important than the dream. For others working in this field I still see the link with industry as a positive step, as the compromise can further drive the project into reality.

These are the implications of designing for a 'practical' issue, although it has very significant emotional and wellbeing implications on the user. There is always this tension of the technicalities gaining importance over emotional gain. I believe this is especially present when designing with inclusive principles in mind. It can be frustrating but both qualities need each other, without resolving the proposal technically it will only become a medium of questioning rather than actively help users. To an extent a 'practical' approach is expecting for it to be resolved, although this is not always the case. It can also be a medium for questioning. Understanding the technical limitations of the project helped establish a foundation of credibility and what would be the utopia.

Language of the product

"Although older we are still vain. We also want to look and feel good."

How do you design an aid that does not make a person feel like they have a problem and connects them rather than feel shame over their body?

Initial prototypes during the development phase focused on getting away from the 'baby diaper aesthetic' defined as large, white, heavily padded with elastic throughout the inside of the leg and Velcro or gussets on the sides. This was due to this aesthetic triggering negative feelings for the user about their body, and prompting insecurity about feeling vulnerable, dependent and no longer in control comparable to an infant. Therefore the attempt was to make it feel and appear more like underwear with a layer of protection. The history of underwear shapes was researched in order to gain an understanding of potential shapes to work with, and the connotations each shape would reference.

A crucial deliberation whilst designing the protective underwear was if to create a discreet or a statement piece. However after group discussions with potential users the design being discreet was an area they felt especially strong about. The reason being this was more important emotionally to users than making a statement about the normality of the condition. But by taking this approach, did it disregard the aim to normalize incontinence by 'hiding' the problem? They did not want to make it feel like a problem, but make it feel like something normal that you are not conscious about.

Therefore ways of disguising padding were explored through decorative elements such as pattern. Small details that added to the experience of the person, such as a beautiful padding on the inside related to enhancing a positive intimate experience of the user with the product. This I feel would be especially relevant for a person in the field of positive intimate experience of the user with the product.

This I feel would be especially relevant for a person in the field of designing aids, the small details that address the persons experience of the product and help them connect with it, such as the woman with the sparkly crutch cover at the Elderly Care Show 2013.

Conceptually the language of the underwear aimed to become a discussion tool to visually communicate and provoke a change in perception. Reminiscent of Hella Jongerius 'My Soft Office' concept keyboard that reflects on people eating at their desk whilst working. The story is clear from the object itself and very effective at provoking one to think about our work habits.

Or Mickael Boulay's Transitions cutlery that helps develop the motor skills of the handicapped hand also questions the common aid's design language but the story is best communicated as a collection of cutlery, rather than the individual piece. Playing and challenging the language of the aid can be a powerful tool for refreshing our approach to what normally would be stigmatized object.

Re-designing gestures and experience of the product

"I don't want to be reminded each time I use it that I have this problem".

Re-designing the user experience to "not feel old" was especially challenging yet interesting to address. Explored during this phase were gestures the design could trigger, and how to avoid gestures also reminiscent of a baby diaper. Therefore when exploring opening and closing systems it was important to introduce details reminiscent of adult garments, such as bra hooks, clips, zippers or ties. This was in order to introduce a positive feeling towards the garment. Avoiding loud sound was an important detail to keep in mind, as it can trigger a negative connotation and could also be embarrassing to use in public restrooms. Re-designing the gestures of putting on and taking of the garment have become a very important element of the design, in order to re-design the experience of the protective underwear. Understanding what design decisions reference and how they influence the experience of the person is especially important for designers to keep in mind when addressing a sensitive issue.

On another scale re-designing the experience of purchasing an aid is also relevant to how a person experiences the product. Being sold within a medical context already stigmatizes its position. What about if instead it was sold within a regular department store? Adult sex toys could be an interesting case study comparison, given they are also a somewhat taboo product yet have become increasingly available in commercial outlets. Could this be the same for stigmatized living aids? As Alice Rawsthorn reflects "Their strategy was to introduce sex shops to the mass market by locating them on busy shopping streets rather than back streets. If they were to succeed, it was important that their new customers, especially women, didn't feel embarrassed when entering the stores, and they kept the name



Re- Designing gestures

Ann Summers because it sounded suitable warm, friendly and familiar. Ms Everywoman, in fact.”¹ This model could be an interesting case study for implementing the protective underwear into a new context.

Further research and the future of this project

Currently the project continues to be developed in collaboration with the Audax Textile Museum in Tilburg at the Textiel Lab with the sponsorship of Artofil superabsorbent yarns. However the future aspiration is to make the concept a reality and propose a well working garment for people affected by this condition to benefit. For this to happen two future key steps must take place in the form of further material research and contextual re-positioning. Now catering to women with mild incontinence, with further future research into material absorption it could include men and cater for full incontinence.

Re-positioning the protective underwear from a medical to a fashion arena would be a next key step to re-fresh its current perception. In this context clever communication would be crucial to inspire acceptance. The ultimate utopia would be to inspire such acceptance that a new category of ‘protective underwear’ would emerge and be found in regular respectable retail outlets amongst other mainstream lingerie categories such as shapewear or hosiery.

Concluding comments and how this relates back to the world we live in

Design is a tool that can help us connect to a current social situation and re-imagine what such change could imply. Throughout this research I have aimed to highlight a rapidly changing social situation and how a design can respond to make peoples everyday experience of an embarrassing issue a little bit more positive.

1 Alice Rawsthorn. 2013. Hello World. London. Penguin Books



Tilburg Textiel Lab

Specifically this has been explored within the context of incontinence aids, a symbol of something we dread needing. A new language and approach to the design of the living aid needs to be explored that does not underestimate the emotional impact they can have and I hope to inspire greater sense of purpose and responsibility in what we create. In the end it is not about the product proposed but the experience and conversation around its cycle of use leading to a change in perspective. This must happen alongside a real proposal that people can really benefit from. Through this project I aim to provoke others to consider moments on the margins that could do with the same attention as our emphasis on designing chairs and lamps.

PROJECT CONTACT REFERENCES & SPECIAL THANK YOU

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