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# **WOOL** FRESH

Nature's Innovation

An exegesis submitted in partial fulfilment of the requirements for the degree of Master of Design, Massey University, Wellington, New Zealand, 2016.

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## Disclaimer

Some information relating to this Masters of Design research is the intellectual property of Wool Fresh, AgResearch and Texus Fibre. As a result, it is excluded from this exegesis.

## Acknowledgements

Wool Fresh  
CEO Darrius Glover, MBA

Massey University  
Dr. Sandra Heffernan  
Sue Prescott  
Mathijis Siljee

Wool Industry Research Limited (WIRL)

AgResearch  
Dr. Surinder Tandon and team

Texus Fibre

Leatherworks  
Chris Pickering

Pyne Gould Guinness Wrightsons (PGGW)

New Zealand Light Leathers (NZLL)

Leather and Shoe Research Association (LASRA)

SGS Wool Testing

Bonny Iris Photography  
Bonny Stewart-Macdonald

Kirsty Bunny Management (KBM)  
Xanthe Whitley



Figure 1 - 2. The Wool Fresh Bag by Llana. 2016

# LLANA

The Wool Fresh Bag | 2016



“ New generations of designers, academics, engineers, scientists and other professionals embrace multidisciplinary critical and creative thinking to approach a complex new world. ”

Astella Saw, 2014, p.26

## Abstract

This Masters of Design research has contributed to product design innovation within the strong wool industry. This design research was conducted in the context of an industry partnership with Wool Fresh. This entrepreneurial venture was initiated by Darrius Glover, Chief Executive Officer (CEO), Boston, USA. Darrius constructed a research based design team to develop and establish an innovative textile within the gym bag market.

Three Masters of Design students combined their expertise from the areas of industrial, spatial and fashion to provide an interdisciplinary approach to design. Their research was conducted in parallel with textile scientists and engineers at AgResearch and Texus Fibre, New Zealand. This interaction between scientific innovation and design established the theoretical framework for this research. The project progressed through three key phases; the development of the Wool Fresh textile, the integration of Wool Fresh into a bag and the associated branding.

Wool fibres naturally absorb and regulate odour, moisture and bacteria. The Wool Fresh nonwoven textile was developed by AgResearch to enhance these properties. This advanced textile is antibacterial and reduces the odour and moisture in sports apparel. The textile innovation is the primary component of the Wool Fresh bag by Llana. Designed for sophisticated, style focused women the bag eases the transition from workout to workplace. As a vessel for the Wool Fresh innovation, Llana enters the market on the fringe of product design and high end fashion.

The commercial aim of Wool Fresh is to provide an alternative application for strong wool and make its benefits available to a wider audience. The viability of the Wool Fresh Bag will be tested in the ensuing months when the results of this research are publicised. If successful, this will ensure the longevity of Llana as a sub brand of Wool Fresh.



Figure 3. Base Detailing: 2015

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# Research Intentions

This section outlines the purpose, aim and scope of this Master of Design research. We present the research questions that this exegesis will discuss and illustrate how we have contributed to an industry lead project. Collaborative and individual design roles will also be identified.

# 01

Introduction  
Objectives  
Project Partners  
Role of Design

## Introduction

### Farm and fibre Material and machine Producer and product

The wool story and its journey into the hands of consumers is logistically and culturally dynamic. With wool at its centre, this Master of Design research has reflected this intricate landscape. Designers, scientists and entrepreneurs have collaborated to investigate and elevate this naturally technical fibre. Wool Fresh represents an international collaboration, a nonwoven textile and a designer bag. These three components reflect a broad knowledge basis and the resulting integration of innovation and design.

The design application of Wool Fresh brings together scientific innovation and product experience. This provides the opportunity for research to examine the possibilities of their relationship. Technical research and development rarely investigates cultural experience and human centred interactions in depth. Through collaborative research and the application of design, these entities can be brought together to exchange ideas and enrich the resulting solutions.

Our research explores the effect of collaboration on product development and design. The Wool Fresh textile developed by AgResearch is antimicrobial and absorbs odour and moisture. Through collaboration, we have assisted the development of the textile to suit the design of a gym bag. The Wool Fresh Bag (WFB) by Llana offers technical storage of sports apparel and complements the professional style of sophisticated woman. By bringing together science and culture, we provide a solution that eases the transition between gym, work and social environments.

The Wool Fresh collaboration acts as a platform for this Masters of Design research. The CEO of Wool Fresh, Darius Glover MBA, is the client for this industry lead project and provided our research scholarships. Wool Industry Research Limited (WIRL) funded research and development (R&D) conducted by AgResearch and Texus Fibre that ran parallel to our research. New Zealand Light Leathers (NZLL) have sponsored this project by providing premium deer leather for the realisation of the proposed WFB. The Leather and Shoe Research Association (LASRA) also made significant leather contributions. The support of the project partners and other representatives from industry contributed to the high standard of deliverables we produced.

Wool Fresh is a nonwoven textile made from New Zealand strong wool. We add value to the textile innovation through a user centred product application. This elevates the R&D output of AgResearch. The potential market demand created through the WFB will increase awareness to the benefits of wool, strengthening the strong wool industry.

This exegesis is structured in a format that enables the clear communication of our non-linear design process. An initial overview will provide an understanding of our research intentions, the industry partners involved and our role as the design team. Our research process and associated methods will be established before an analysis of the projects contextual scope. The primary research we conducted throughout the project will then be analysed as it informed each stage of development. An explanation of the framework for design and the iterative prototyping process will follow. Lastly the design solutions; Wool Fresh and the Wool Fresh bag by Llana will be presented. To conclude, the project will be reflected upon through the perspectives of each designer and as a collective.

As a trio of industrial, spatial and fashion students, we have developed an organic and effective design process. Our dynamic interaction and knowledge of contemporary design practice has offered a fresh perspective to the strong wool industry. We have conducted user centred research methodologies to develop empathy, creativity and rationality. These attitudes help to understand issues ranging across varying contexts, contributing to the rich quality of design. Through a rigorous design process we have refined the WFB to a quality which resonates with the high fashion market.

An array of technologies and methodologies were employed to enable collaboration. Skype, email and website platforms were used to address the geographical spread of project partners. We found information was most effectively communicated through concise videos, diagrams and reports. The ongoing nature of the entrepreneurial venture required the creation of regular content for the clients marketing purposes. These strategies were adjusted to communicate with the target market, which focused on professional American women.

Building relationships with other industry experts contributed to our understanding of the wool industry and bag manufacturing within New Zealand. Dr. Surinder Tandon, the lead scientist of the Wool Fresh project, made two visits to Wellington to discuss the process. We received funding from Pyne-Gould Guinness Wrightsons (PGGW) to meet with AgResearch in Christchurch. Guests from industry and the media were present at design critiques which took place throughout the year. At the commencement of the project, Darrius visited New Zealand which initiated our working relationship with the client.

Our design is situated within a market where synthetic fibres have damaged the current position of the strong wool industry. Wool is frequently exported as loose fibres, which loses potential revenue for New Zealand. Development and manufacturing woollen products in New Zealand can help strengthen this industry. Our design has been developed to keep the manufacturing process of the WFB in New Zealand, as this is central to the values of the Llana brand. While this presented certain complications, discussions with industry uncovered key insights into resolving specific details of bag design, industrial construction methods and material sourcing.

The design of the Wool Fresh Bag by Llana acts as a vehicle for this Masters of Design research. This exegesis presents the process and findings of this interdisciplinary design team and the result of our collaboration with industry.

## Objectives

At the commencement of the project our client, Darrius presented his research and ideas on how he envisioned the Wool Fresh textile could benefit consumers. Through working closely with the client during the first few months, we refined the objectives and produced clear deliverables. The following issues demonstrate our research framework and responses.

### Aim

This Master of Design research will investigate how design can be applied within the collaborative context of an industry partnership. Our design research will systematically examine and develop the optimal method for integrating the Wool Fresh innovation into a gym bag. This inquiry will establish how design can add value to commercialising the products of R&D, specific to the strong wool industry.

### Research Questions

1. How can Master of Design research contribute to the collaborative context of an industry partnership?
2. How can research, development and design strengthen the New Zealand strong wool industry?
3. How can the Wool Fresh textile be integrated into a gym bag which complements the professional image of sophisticated women?
4. How can we communicate the benefits of Wool Fresh to consumers?

### Issues

1. The current gym bag market has limited options for a functional bag that is suitable for women in the workplace that maintains their professional appearance.
2. Consumers expect products with advanced performance.
3. Consumers are increasingly concerned with the material composition and origin of consumer goods.
4. New Zealand strong wool has decreased in value due to competition within the fibre market and a lack of research, development and design.

### Brief

1. Collaborate with industry partners to develop the Wool Fresh textile.
2. Humanise the Wool Fresh innovation by integrating it into the design of a bag with the intent of manufacture.
3. Develop associated branding and content for commercialising the Wool Fresh Textile.
4. Develop associated branding and content for commercialising the bag.

# Project Partners

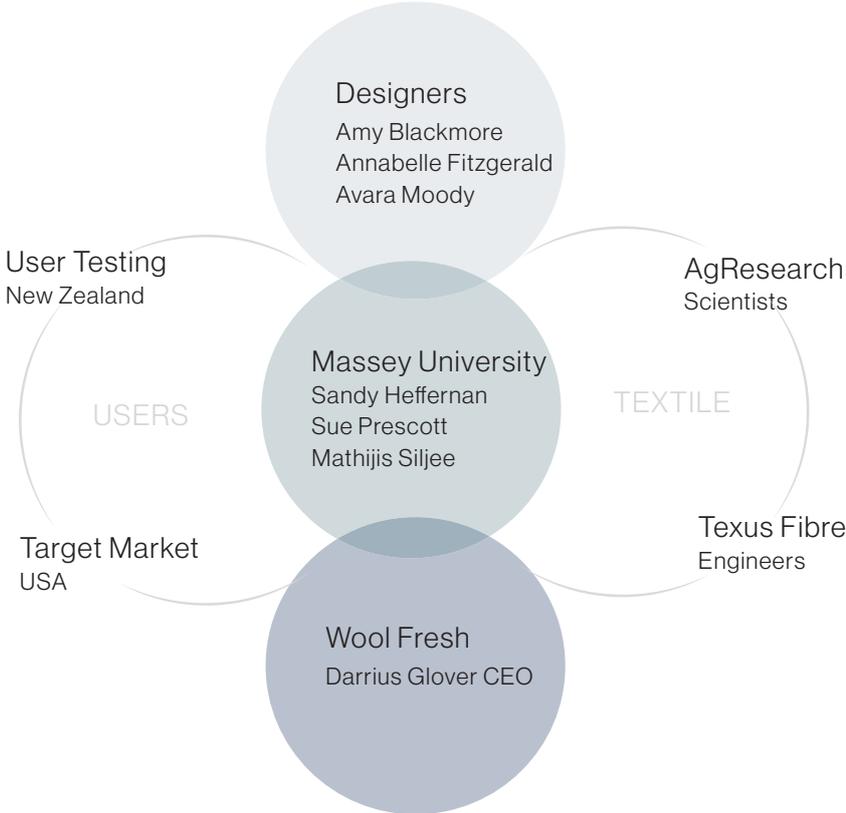


Figure 4. This diagram provides an overview for the parties connected to the Wool Fresh collaborative project: 2015

# Role of Design

Our role within the project was to humanise the propriety Wool Fresh textile and apply it to the WFB. Through the collaborative process with AgResearch, we developed a set of design parameters that enable the function of Wool Fresh.

A rigorous research process developed understanding of the user centred design methodology that was required to position the WFB within the appropriate market. Conducting primary and secondary research informed a framework for design that guided the iterative prototyping process.

## Individual Design Roles

With backgrounds in fashion, industrial and spatial design we have combined three independent design perspectives and have actively developed a strong group dynamic. Each of us has had a distinct design role to contribute to the commercialisation of the Wool Fresh textile and development of the WFB by Llana. We will discuss them briefly to provide an overarching view of our strengths and approaches to design. Our individual reflections in section eight will expand on how our unique approaches added value and shaped the outcomes of this design research.

### Avara Moody Industrial Design

With a background in industrial design I have contributed an understanding of how to develop consumer products with a user centred approach. I have ensured the creative direction of the project has been cohesive throughout the areas of product design, branding and communication. I facilitated the development of a research framework to ensure a shared vision within interdisciplinary design team.

My approach to design is centred around the notion of balance and solving issues with combination of intuitive and analytical mindsets. This was valuable during the generation and refinement stages of the prototyping process to develop a design which is rich with quality and innovation. My sensitivity to the team's creative dynamic has enabled me to facilitate the team to work through highly complex issues with a constructive approach.

## Amy Blackmore

### Spatial Design

Throughout this Masters of Design I have drawn from principles of Spatial design and a lifelong involvement with the agricultural sector to connect Wool Fresh and human experience. Creating systems that enabled collaboration with project partners and communication with consumers was central to my role in this Masters of Design research. Within this framework, the design team was able to work organically, which strengthened our group dynamics. I often filled the role of project manager within the design team and became the primary point of contact for the client and external parties. A singular voice helped to consolidate information and understand the factors that influenced each of the project partners. This enabled design decisions that balanced innovation, engineering, marketing and design.

My ability to establish ideas quickly and convey them accurately, ensured the design team gathered quality feedback which directly informed the design process. During Skype interviews and design critiques I conducted conversations with flexibility, which led to discoveries that impacted our process for analysing design decisions. My contribution also included the planning and creation of videos and visual content for a range of applications. I employed visual and sensory techniques to enhance the communication of the scientific qualities of Wool Fresh in a human centred way.

## Annabelle Fitzgerald

### Fashion Design

With a degree in fashion design, I contributed an array of specialised techniques, experiential knowledge and a concern for high quality to the collaborative team. My holistic approach to research is shaped by the combination of design research methods and personality traits. I find best results through the iterative design process, by immersing myself within new contexts and embracing my introverted personality, allowing the time to critically reflect.

I voice my ideas in a well considered manner and support my thoughts with drawings and samples. My communication with others is professional, clear and patient. Throughout this research project I maintained the correspondence with AgResearch, specifically reporting to Dr. Surinder Tandon. I was able to translate the textile jargon and recount the statistical data to the design team. My prior knowledge of textiles and mathematical ability allowed me to conduct this role with ease and efficiency.

# Process Overview

Our research approach will establish how we explored the design issues we identified in part one. Each research method will be clearly outlined and the intention will be discussed in relation to the project.

# 02

User Centred Methodology  
Process

# User Centred Methodology

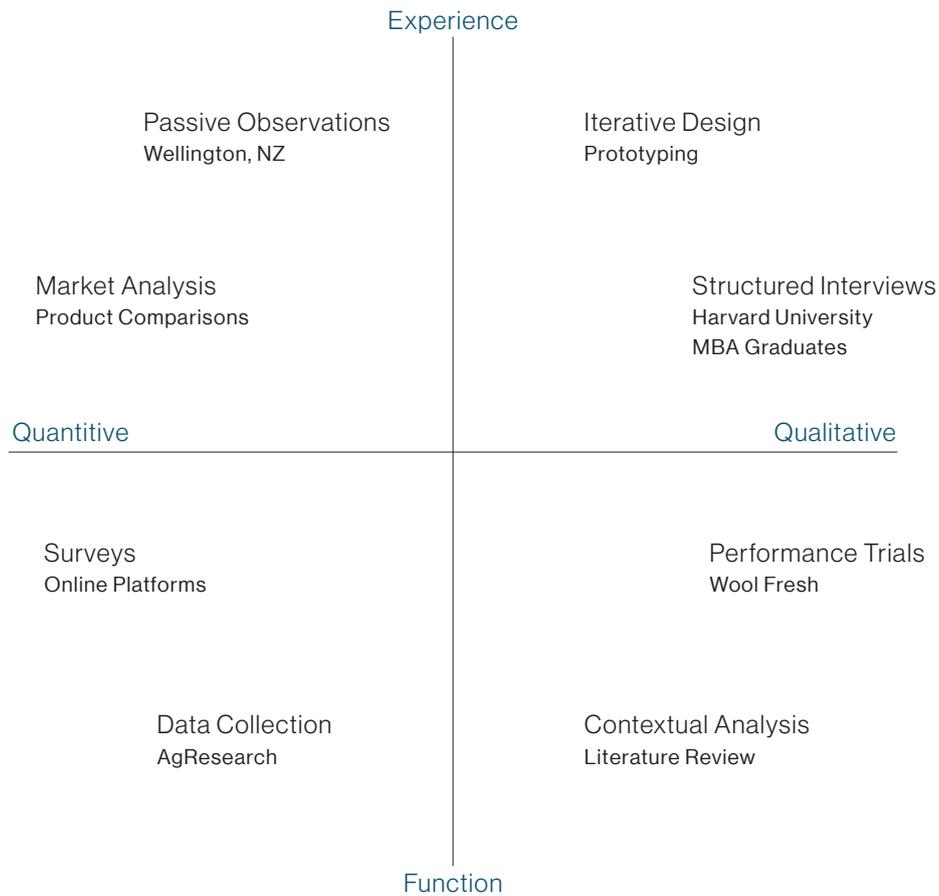


Figure 5. The research methods used to construct our user centred design methodology. Adapted from Laurel: 2003

## Research Approach

A user centred design methodology was used to establish a deeper understanding of the research questions and issues. Developing empathy for the user affected the creativity and rationality used to uncover insights (Vanbelleghem, as cited in Baerten & Bauwens, 2013). The research posed a combination of functional and experiential issues. These were investigated through the use of quantitative and qualitative research methods.

Our research was design led and we used the creative process as a means to interrogate ideas, test hypotheses and pose new questions (Does de Willebois, 2012). While we remained methodical, our approach valued creative exploration to inspire true design innovation (Valcke, as cited in Baerten & Bauwens, 2013). Following on from the research methodologies table above, we break down the intentions and relevance of each process in the next section.

## Research Methods

- p65 - 73 Iterative Design Process  
Prototypes were developed through small adjustments that led to the rapid exploration of ideas.
- p 54 - 55 Structured Interviews  
Skype interviews were conducted with eight Harvard University MBA graduates that identified as our target market. We used this technique when seeking design feedback.
- p57 Performance Trials  
Athletes trialed a bag containing Wool Fresh to test its performance outside the lab. The parameters of this test were developed alongside AgResearch.
- p25 - 49 Contextual Analysis  
The review of existing literature provided a platform of initial knowledge to build upon through design research.
- p56 Data Collection  
In collaboration with AgResearch, we tested options for the additional materials of the three layer system.
- p52 Surveys  
Online surveys were used as a tool for defining trends and preferences within the target market.
- p43 - 49 Market Analysis  
Analysis of the product market for gym bags identified the opportunity for the WFB.
- p53 Passive Observations  
Inner city observations provided insights into sport apparel and accessory trends.

# Process

The process diagram illustrates how the areas of product, material and research development correlate.

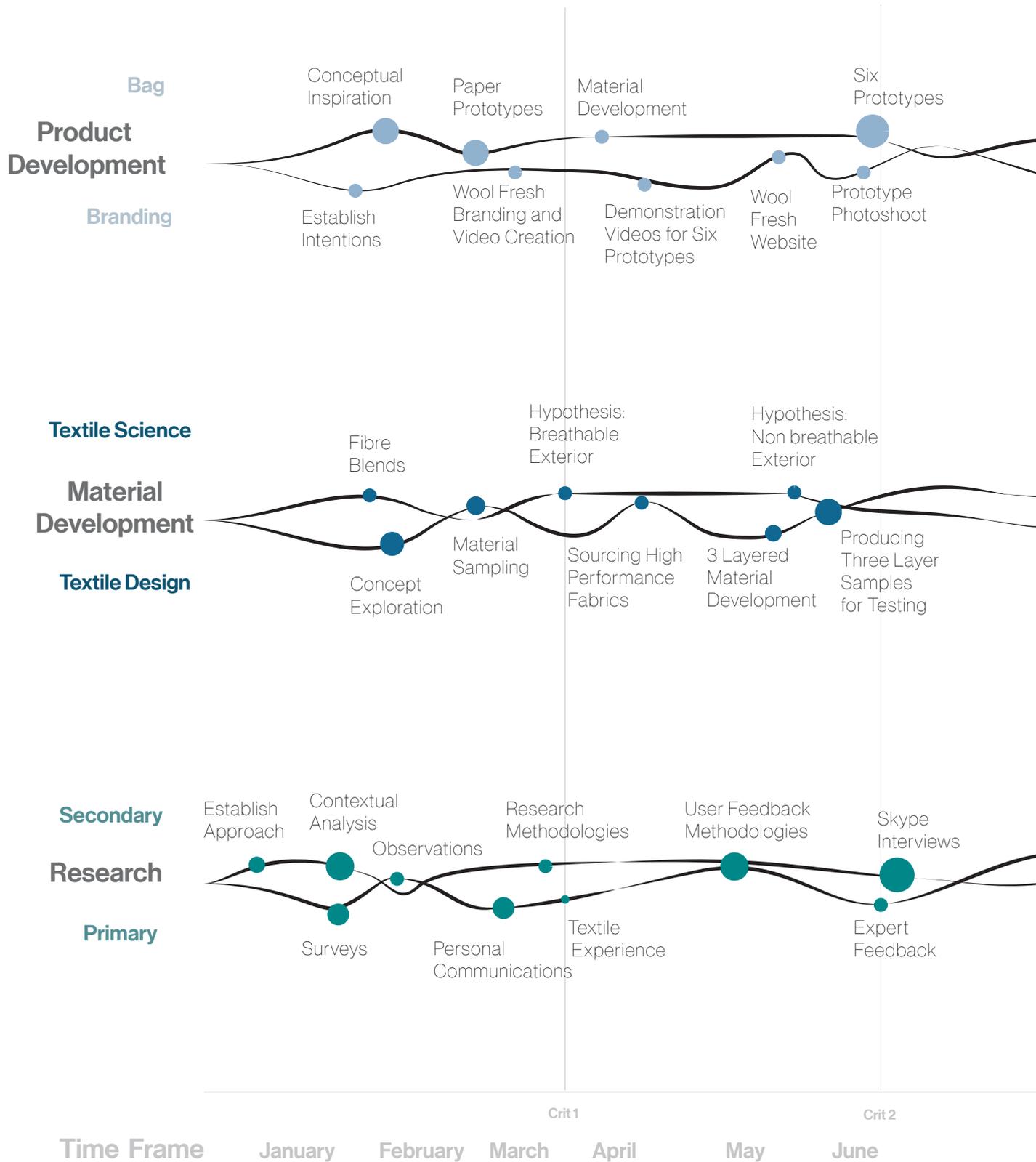
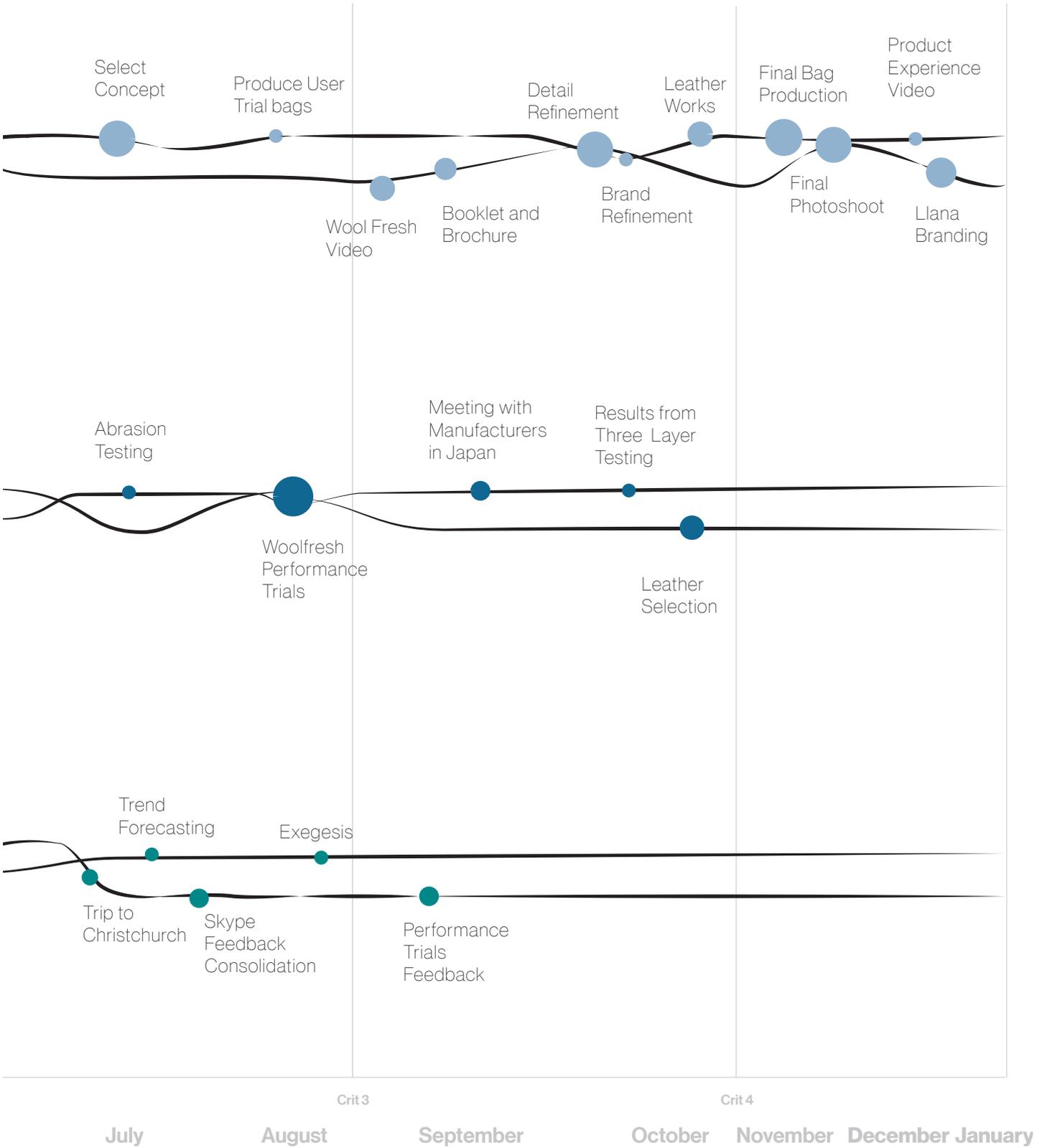


Figure 6. Demonstrating the order of project developments and the interaction between three key areas of the project: 2015



# Contextual Analysis

The following market analysis and literature review examined existing knowledge that created a platform for design research.

# 03

Wool Market  
Textile Market  
Product Market



Figure 7. New Zealand Sheep Farm: 2015

## Wool Market

Understanding the wider context of the wool market is imperative when developing a product based on strong wool. How wool is perceived by global consumers has influenced our approach to market and communication.

## Competition With Synthetics

R&D of synthetic fibres has given them a competitive edge over wool (Hearle, 2001). Wool value dropped in the 1980s due to increased competition from synthetic fibres (Jones, 2009). This was in part, due to the demand for synthetic fibres as they were cheaper and easier to produce (DeLong, Park & Wu, 2012). Manufacturers are able to precisely control the properties of synthetic fibre, guaranteeing consistency and expanding possible applications. Although wool has many beneficial properties, applying further R&D and design can add value to the industry.

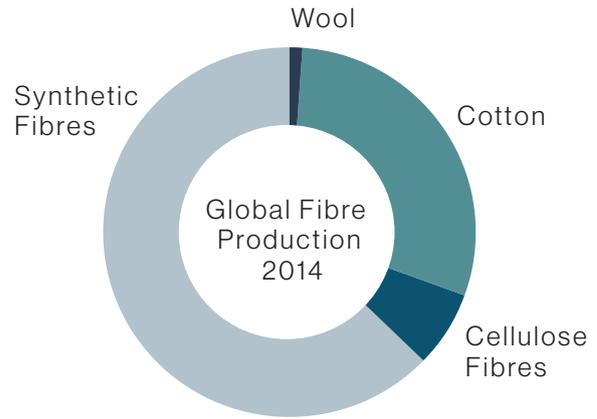
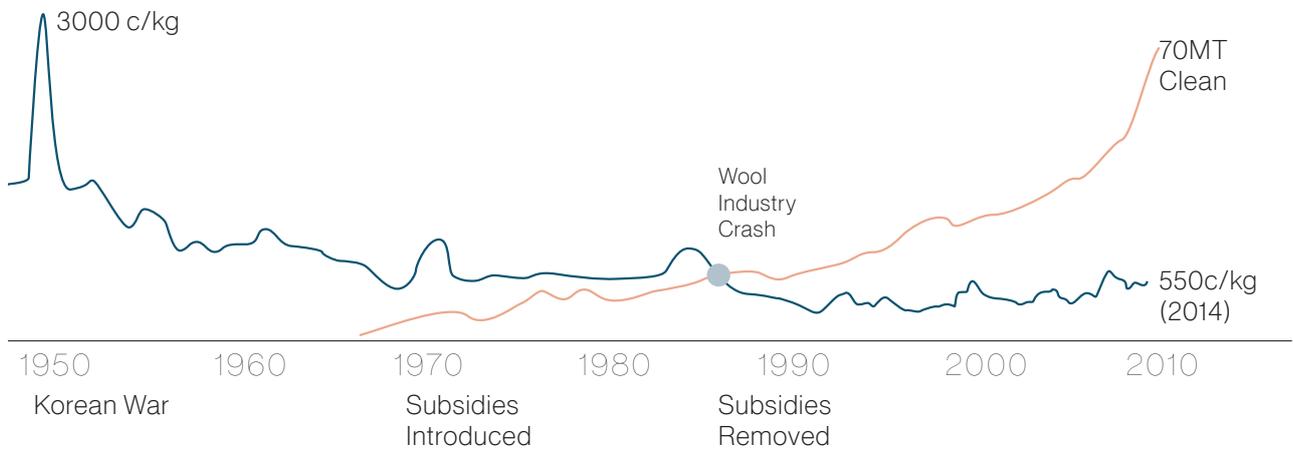


Figure 8. Wool accounts for only 1.3% of global fibre production in an industry that is dominated by synthetics. Adapted from Lenzing: 2014



Key

- Global Consumption of Synthetic Fibres. (MT Clean)
- Wool Price (c/kg Greasy)

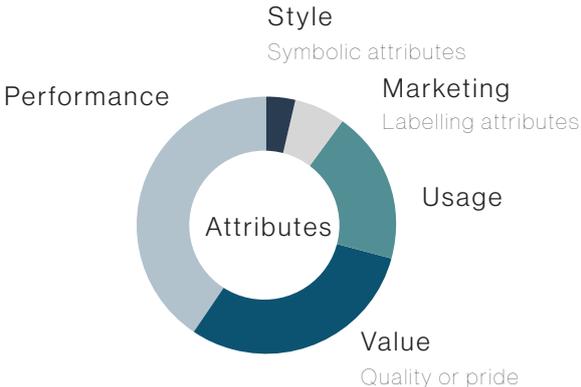
Figure 9. The influence of synthetic fibre consumption contributed to the New Zealand Wool industry crash during the 1980s. Adapted from Mecardo: 2014 and Te Ara: 2014

# Perceptions of Wool

Synthetic and natural materials are perceived differently, which affects consumer decision making when purchasing a product. These perceptions are due to the fibre's respective properties and how these affect the performance of a product. As polyester is both durable and machine washable, the fibre is deemed 'easier' by consumers than caring for wool (Kadolph, 2010). Consumer connotations of wool is that it is hard to care for as it is known for shrinking when wet (see Appendix A).

Investigation of tactile response and touch preference helps designers optimise user satisfaction. Delong et al. (2012) conducted a study of one hundred and twenty three American students. They listed soft, smooth and warm as favourable properties of wool. However, wool was listed by 48% as a fabric they disliked touching due to scratchy, rough, and itchy qualities. People's perception became more positive as they continued to interact with and learnt about a material qualities (Delong et al, 2012).

Participants' views on appropriate applications for wool were influenced by their location. American consumers see wool as a symbol of an environmentally friendly lifestyle and emphasise its natural status (Sneddon, Lee, & Soutar, 2012). New Yorkers associated wool with tailored suits, whereas people from Colorado associate it with the outdoor market (Sneddon et al, 2012).



“ Increasing the understanding of wools technical capabilities could positively influence consumer choices. ”

Woolmark Business Intelligence Group: 2004

Figure 10. A consumer perspective on the important attributes of wool. Adapted from Sneddon et al: 2012.

## Insights

Analysing the target market's perception of wool products, ensures the project's deliverables are able to address unfavourable preconceptions. Increasing the understanding of wools technical capabilities could positively influence consumer choices (Woolmark, 2004). Recent innovations such as machine washable wool are slowly affecting consumer behaviours. Such developments consider consumer needs and ultimately change user behaviour which is creating more demand for woollen products.

# Global Position of New Zealand Wool



Figure 11. The reputation of New Zealand wool. Altered from Faulkner: 2012 & Wools of New Zealand: 2012

## Grading of New Zealand wool

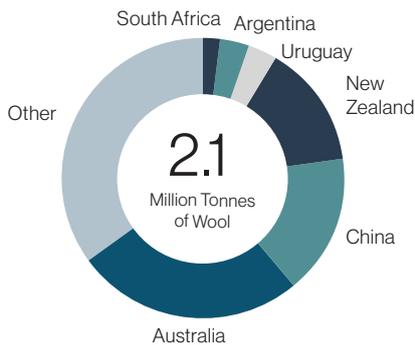


Figure 12. Global wool production in 2013. Adapted from International Wool Textile Organisation: 2015

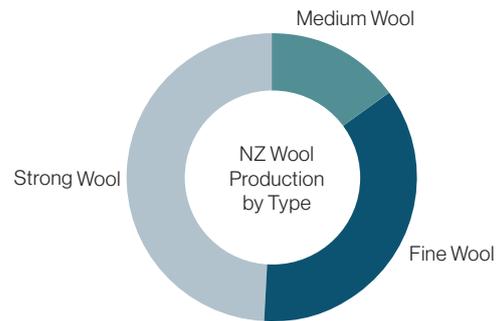


Figure 13. Fine, medium and strong wool grading of New Zealand's total wool production. Adapted from Conforte, Dunlop, & Garnevska: 2011

The country in which wool originates affects its reputation, as distinct attributes or connotations are created (Wools of New Zealand Limited, 2012). New Zealand wool is perceived as one of high quality and holds reputable animal management practises. New Zealand produces 13% of the global wool supply, and almost half of this clip is strong wool. There is opportunity for innovation in the strong wool sector as it has been overlooked due to the focus on the R&D of fine wool. The Wool Fresh innovation utilises New Zealand's strong wool in an effort to diversify its applications and strengthen the industry.

# Grading of New Zealand wool

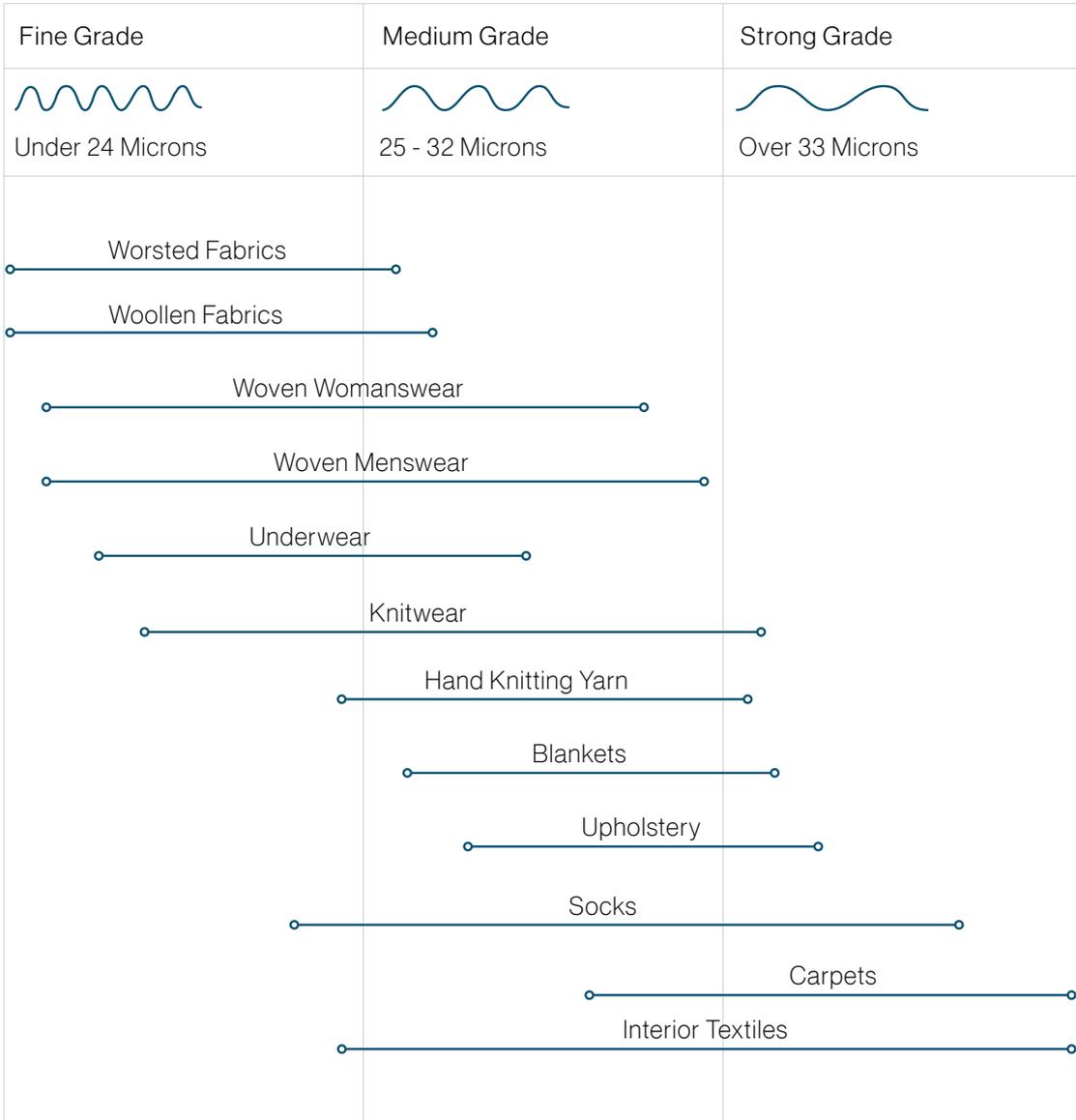


Figure 14. The grading and associated product applications of New Zealand Wool. Adapted from Conforte et al: 2011

### Fine Wool

While the New Zealand fine wool industry generates a small section of the national wool clip, it demands a high price and enjoys a good reputation in the market. This is the result of targeted marketing campaigns and investment in research, development and design.

### Strong Wool

Strong wool is seen as secondary in quality and importance to fine wool and therefore attains a lower price. These fibres are coarser and produce less favourable tactile responses. Its primary application is in carpet and floor coverings that utilise the durability of strong wool.

# Wool Network and Branding

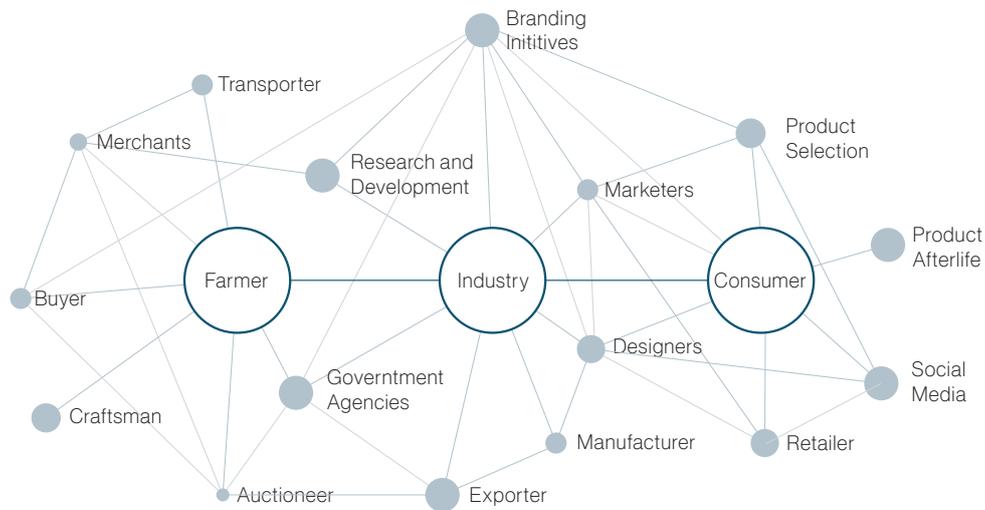


Figure 15. The current relationships within the New Zealand wool network: 2016

Within the current framework of the wool industry, a complex network exists between farmer and consumer. Wool requires processing in the forms of scouring, trading, spinning and manufacturing. This means wool is bought and sold by numerous companies before it reaches the consumer. This network lacks transparency and its many components create confusion (Bagrie, Croy, & Williams, 2013). In this model, farmers are disconnected from the end product.

Recently a new commercial model has evolved that reduces the number of organisations involved in processing wool. Companies such as New Zealand Merino and Wools of New Zealand, have been created to maintain greater control of their product (Wools of New Zealand Limited, 2012 and NZTE, 2013). Wool branding initiatives are a marketing effort to gain a higher price for woollen products. They add value by promoting traceability, animal welfare and highlighting quality control measures (Purelana, Laneve & Redband respectively). Farmers are able to invest capital into branding initiatives, or support them by committing their clip.



## Adding Value Through Design

The wool industry could be strengthened through increased transparency, which would attract more investors interested in innovation. For this to happen, Bagrie et al. (2013) critiqued the wool industry and concluded that in order to move forward drastic changes were necessary:

- More investment
- Streamlining the supply chain
- Closer partnering with retailers
- Clearer benchmarks
- Better information flow and price signals

While this recommendation touches on important points, it overlooks the ability of design to add value through the creation of desirable consumer products. Design generates a deeper understanding of user needs and desires to create market demand (Does de Willebois, 2012). Wool fibres possess favourable qualities that are well suited to a number of applications. Educating consumers about the benefits this natural fibre could have on their lifestyles is central to developing an innovative design solution. Through the incorporation of design and collaboration between organisations, the industry has the ability to improve its market standing. Wool Fresh contributes to the strong wool sector by diversifying the possible applications for this underutilised, renewable resource. This places Wool Fresh in a unique gap in the market and provides the opportunity for influencing consumer perspectives on wool (Woolmark, 2004).

Figure 16. Production of a needle felted, woollen material. Adapted from Pettinatura di Verrone: 2015 & Australia Green Continent: 2016 & Queensland's Country Life: 2016 & Colorado Grown Fine Fibres: 2014 & Graham: 2014 & Authors own Images: 2015





Figure 17. Wool Fresh and moisture: 2015

## Textile Market

This section outlines the properties and benefits of Wool Fresh and how it is placed within the current textile market.

## Textile Innovation Review

Within material science, functional textiles are becoming increasingly important as they offer a range of applications (Kiekens, Burght, Kny, Uyar & Milašius, 2014). They represent the combination of new technologies and production methods to improve the traditional performance of textiles.

Wool Fresh positions itself within the textile innovation sector as it is a material that has undergone scientific development. Throughout our design research it was important to develop an understanding of current textile innovations. This ensured our design process was driven by technical knowledge and current consumer needs. Nanotechnology and unique membrane systems (Hibbert, 2004) are described as they relate to the scientific innovation that underpins Wool Fresh.

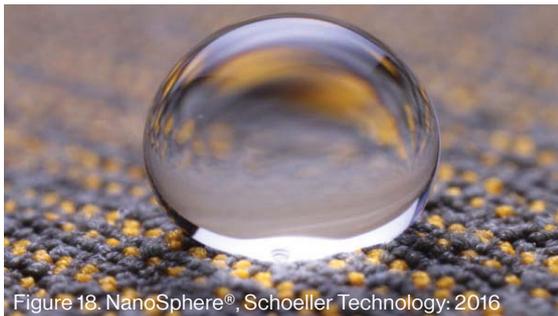


Figure 18. NanoSphere®, Schoeller Technology: 2016

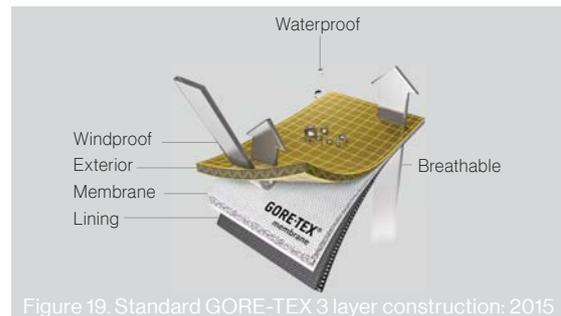


Figure 19. Standard GORE-TEX 3 layer construction: 2015

## Nanotechnology

With advancements in technology, technical textiles are able to attain novel finishes that appeal to the increasingly perceptive market (Holme, 2007). Consumers get more out of their apparel through increased comfort, protection, aesthetics and performance (Holme, 2007). Nanotechnology provides a range of enhancements to traditional textiles. The addition of a hydrophobic coating creates a 'self cleaning effect' that offers protection from perspiration and grease (Astella Saw & Haleta, 2014). Silver nanoparticles enhance textile surfaces through offering antibacterial properties and odour control (Eng & Haydon, 2013). Nanotechnology modifies the surface structure of textiles by the addition of molecules (Hibbert, 2004). This technology can be realised through various methods noted by Eng & Haydon (2013) such as:

**Coatings:** Post manufacture of base textile fabrication.

**Composites:** Pre manufacture combination of nanoscale properties into fibres.

**Nano fibres:** Fibres engineered with nanoscale dimensions and nanoscale fibres.

**Nano enabled processes:** Enhancing the manufacturing process of textiles.

## Membrane Systems

Textile layering innovations include purpose built membranes that are positioned between exterior shell and lining materials. Nonwoven membranes are hydrophilic films that are available in solid or microporous states (Hibbert, 2004). These systems allow for superior breathability, releasing perspiration as the water vapour is pushed through the hydrophilic areas until it is forced through the external shell and evaporates (Hibbert, 2004). Elsasser notes the 'push-pull' effect created from these membranes explains how they can simultaneously repel water in liquid state, but release water vapour. The membrane allows for this dual action as it is impenetrable by liquids but the small pores let vapour pass through (Elsasser, 2010). GORE-TEX, the reputable brand for durable outerwear apparel and accessories is a prime example of this innovation. They use this system to provide protection from the elements and allow superior breathability.

## Wool Fresh Textile Specifications



Figure 20. The properties of the Wool Fresh textile: 2016

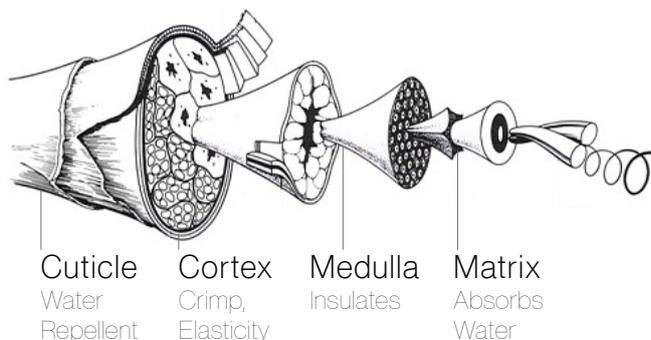


Figure 21. Wool fibre structure. Its components and their benefits. Adapted from Fraser & Macrae: 2015

“Wool Fresh is an advanced antimicrobial textile material offering enhanced absorption of malodour and moisture vapour.”

S. Tandon, personal communication, 12 August, 2015

Wool was identified as the fibre of choice for this research project due to its natural properties of moisture, odour and bacterial management. Wool fibres are antimicrobial as a high concentration of antibacterial fatty acids are present on the outer layer of the fibre (*Wool Revolution*, 2016). The matrix which absorbs moisture consequently means that odour is decreased as bacteria cannot reproduce.

Wool Fresh has substantial benefits in comparison to standard wool. AgResearch has developed a fibre blend and treatment that enhances the absorption of sweat, odour and reduces bacteria from sports apparel. As the main component of the WFB it keeps items fresh and dry. The integration of the textile is explained overleaf.

Wool Fresh is a nonwoven, needle felted material that was engineered by Texus Fibre. This technique was selected to control the density of the fibres. This was essential to enable the loft required to ensure functionality of the textile.

## Three Layer System

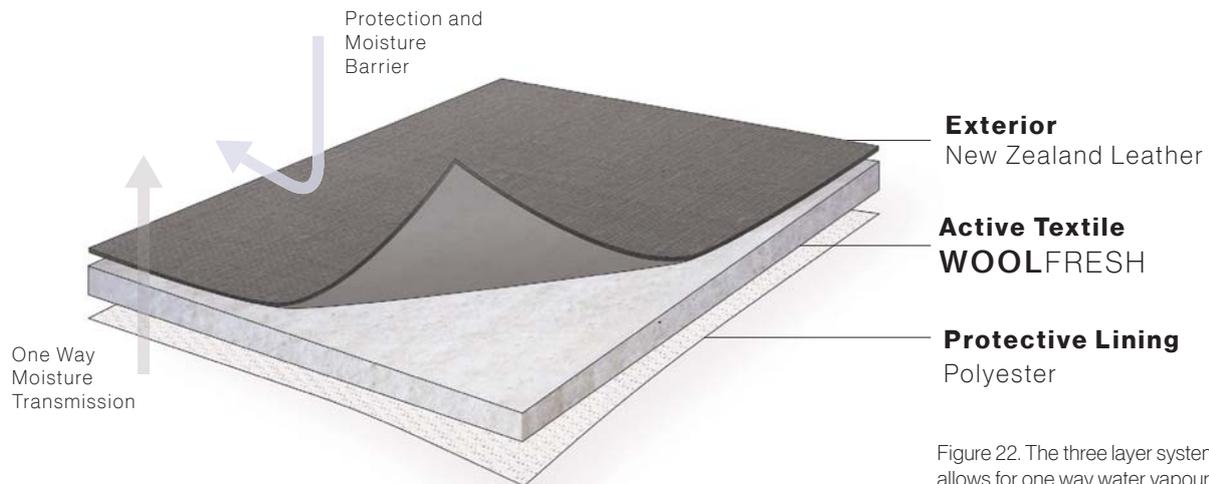


Figure 22. The three layer system allows for one way water vapour transmission which enhances the functionality of Wool Fresh: 2015

Wool Fresh is not a standalone fabric and requires the support of other materials. For the purposes of a bag, it is essential that it is integrated into a three layered system. This structure creates the optimum environment for the active textile by protecting it from external moisture and localised stresses. The absorption and transmission capabilities of the three layer system works in one direction. The exterior shell repels any external water so Wool Fresh can concentrate on extracting the moisture and odour from the inside.

We have selected leather for our exterior shell as it provides waterproofing and is desirable by consumers. Leather was the luxurious alternative to synthetic waterproof materials, which resonated with our target market. The lining we have chosen is a superior wicking sports fabric which draws in moisture and disperses it evenly through the surface area. This selection was made to allow Wool Fresh to absorb moisture evenly into its membrane to improve performance. We devised specific construction methods (page 68 & 73) to bring each layer together to ensure the following parameters were met.

### Textile Parameters

1. Must maintain loft.
2. Maintain breathability.
3. Access moisture on one side but protected from the other.
4. Protection from abrasion.
5. Must maximise surface area of Wool Fresh.

### Implication

1. Waterproof on one side and porous or mesh like protection on the reverse.
2. Exterior layer should be non-breathable.
3. Wool Fresh cannot be bonded or laminated to component fabrics. Lamination would condense loft and the bonded seal would hinder breathability.

## Benefits of Wool Fresh



Wool Fresh technology is different to other textile innovations on the market. It offers a natural alternative to synthetic membrane structures like GORE-TEX and functions comparative to nanotechnology. Antimicrobial, moisture and odour absorbency are the properties that have been further enhanced by the scientific engineering of the textile. For Wool Fresh to be successful within the textile market, making these points of difference known consumers in a comprehensive manner is necessary (O'Mahony & Braddock, 2002). As a nonwoven textile, Wool Fresh holds significant benefits. It has low manufacturing costs compared to woven and knitted fabrics as it eliminates the process of converting the fibres into yarn. Labour costs are consequently reduced and the overall process is streamlined. The production of standard dry-processed nonwovens in particular have very low environmental impact due to the minimal water and chemical consumption (Thompson & Thompson, 2014). Nonwoven fabrics can be easily recycled, which offers an extended life cycle of the fibres (Thompson & Thompson, 2014).

The manufacturing details of Wool Fresh are the property of Texus Fibre and AgResearch, consequently conclusions cannot be disclosed in regards to water and chemical consumption. However, the benefits of the economical production in terms of labour remain consistent. Wool Fresh contributes to the growing awareness around the benefits of nonwoven textiles.

## Alternative Product Applications

The unique benefits of Wool Fresh are applicable to a range of product applications and could be used in the form of nonwoven, loose fibre or yarn. Wool Fresh is relevant to industries that are concerned with the control of bacterial build-up and the reduction of odour and moisture.

### Needle felted Wool Fresh

(Economical manufacture)

1. Medical filters
2. Mattress protectors
3. Home Insulation
4. Sound Insulation
5. Pet bedding
6. Padding in sporting equipment

### Loose Wool Fresh Fibres

(Minimal cost in manufacture)

1. Bedding
2. Wadding

### Wool Fresh as a Yarn

(Significant increase in manufacture cost)

1. Apparel
2. Sold as specialised high performance yarn
3. Homewares
4. Woven / knitted textile
5. Medical textiles (bedding, filters)

## The Science of Sweat

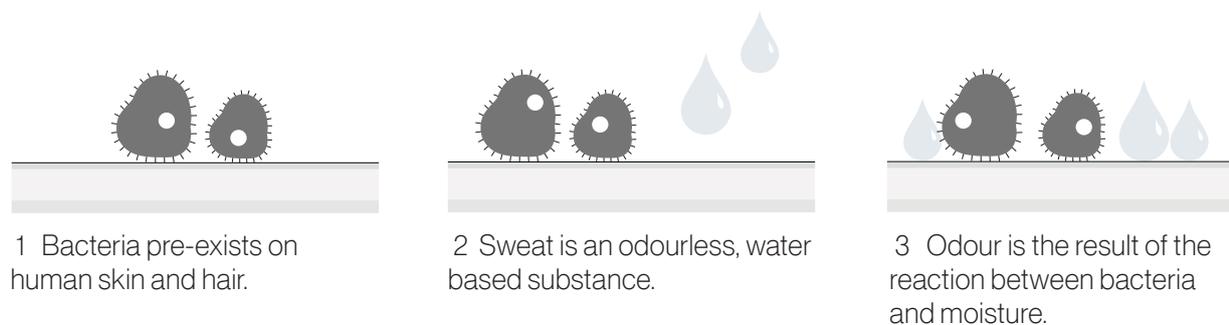
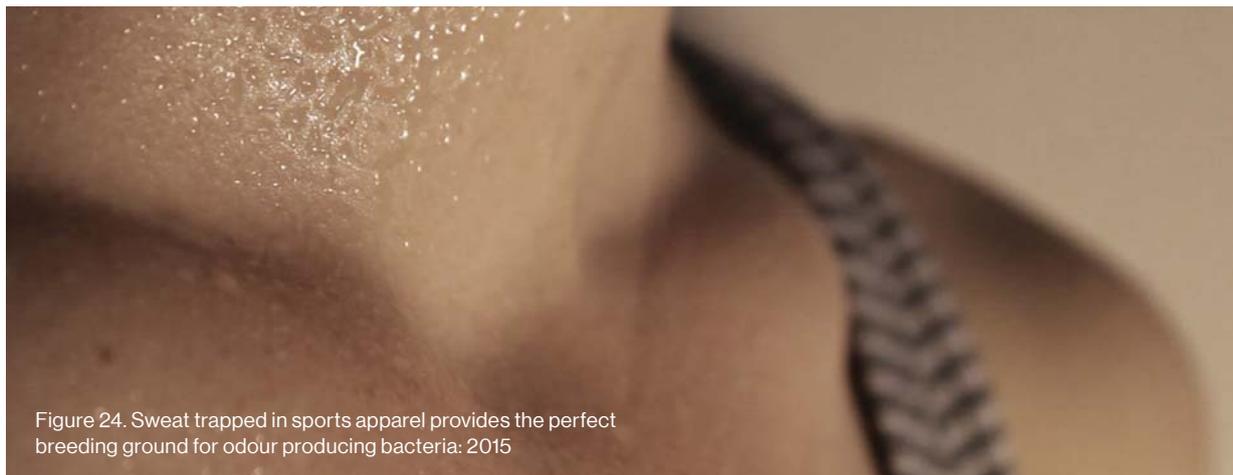


Figure 25. Odour production: 2016

Wool Fresh has been developed to target sweat. The textile's functions of moisture and odour absorption are particularly useful to consumers that desire more hygienic methods of storing sweaty sports apparel. The science behind sweat was examined to understand the context in which Wool Fresh performs. Odour is easily reduced if there is little or no moisture for the bacteria to thrive in (Saga, 2002). To keep people dry and odour free while exercising, sports apparel brands create garments with antimicrobial and sweat wicking properties. These are market solutions for the immediate odour produced, but not the odour build up that occurs post-workout.

“ The sensual logic of capitalism have fashioned certain cleanliness practices by appropriating certain smells as ‘fresh’ into the marketplace, where people ought to feel ‘good’ for not looking or smelling sweaty. ”

Waitt & Stanes, 2015, p. 30

# Benefits to Consumers



- Specialised Textiles
- Scent Related Consumer Products

Figure 26. The market for consumer products that focus on the elimination of unpleasant smells. Adapted from McQueen, Keelan, & Kannayiram: 2010

There is a significant demand for products that actively reduce odour as consumers seek a more hygienic approach (McQueen, Keelan, & Kannayiram, 2010). Wool Fresh is offering a solution that focuses on the post-workout phase. Standard gym bags are not a hygienic method for storing sweaty sports apparel as they create an optimal environment for bacteria. Our concern is that odour is not only produced while exercising, but is prolonged by people storing their sports apparel in bags throughout the day. To help consumers avoid this issue Wool Fresh offers a solution to decrease odour build up, and keep sports apparel fresh and dry.

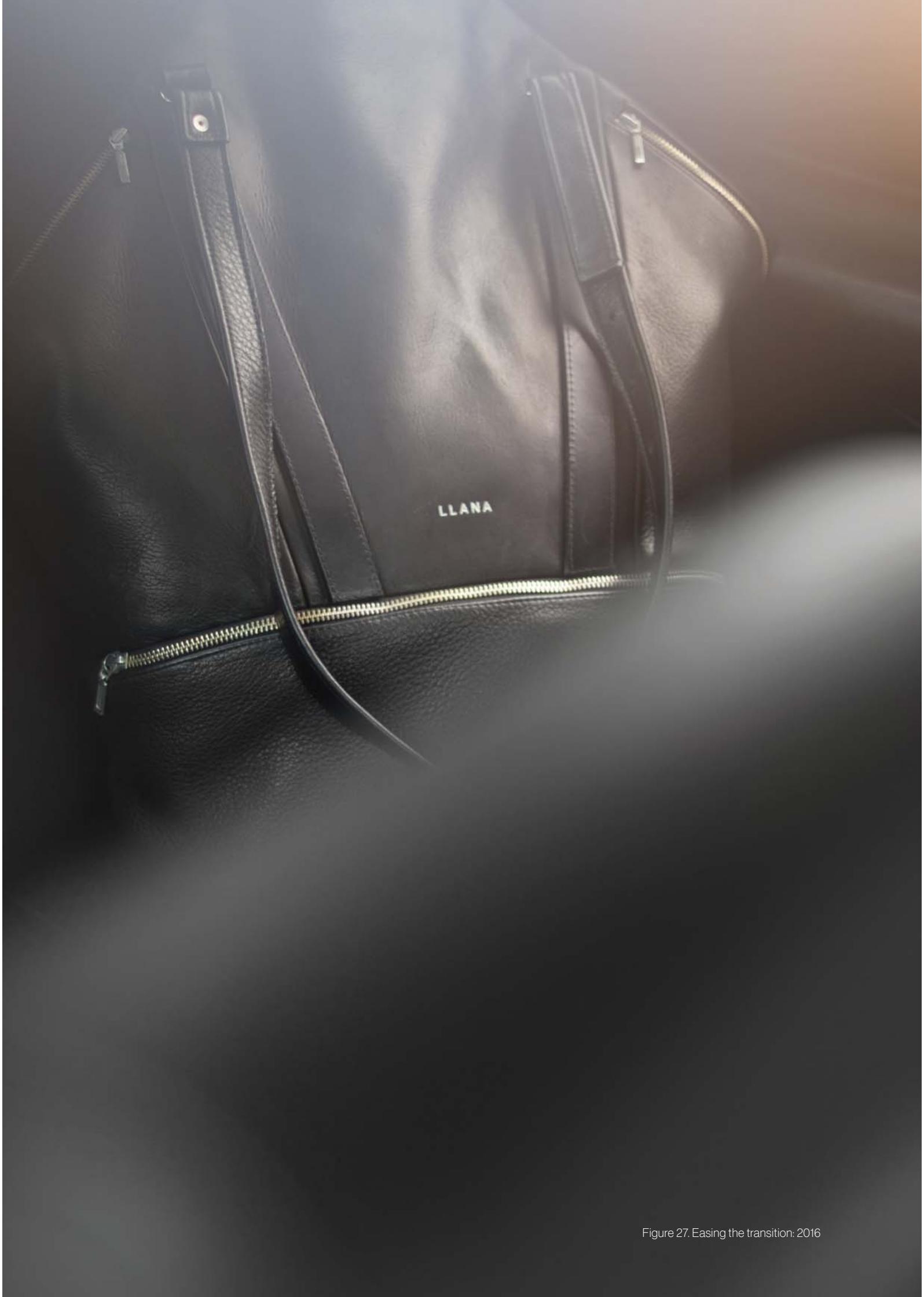


Figure 27. Easing the transition. 2016

## Product Market

This section will establish how the WFB by Llana is positioned in the consumer product market.

## Branding



Figure 28. The qualities of Wool Fresh and its sub-brand, Llana: 2016

Llana has been created as a sub-brand to launch Wool Fresh. In order to understand the individual brand identities, target market and experiential issues, we had to establish the relationship between Llana and Wool Fresh. This in depth understanding and response through design generates products that consumers desire (Emami & Wagner, 2014).

**Wool Fresh** is the advanced performance textile. Its brand image encompasses the value added through New Zealand based research, development and design. There is a strong focus on the importance of natural resources and collaborative innovation.

**Llana** acts as a vessel for the Wool Fresh textile, which enters the market on the fringe of technical product design and high end fashion. The brand speaks to the target market with a sophisticated and intelligent approach as these women appreciate the quality of cutting edge products.

## Target Market

Llana's target market are women who have a strong sense of wellbeing and maintain a healthy lifestyle through regular exercise. With increasing pressure from their professional careers they endeavour to balance their busy schedules. Their high profile careers provide them with a disposable income enabling them to live a comfortable lifestyle. They are intelligent consumers, with a critical approach when investing in a product or service. They favour products that display a sense of quality and represent future trends. The target market was defined to focus on American women to coincide with the client's commercialisation strategy. To investigate the target market in more depth a persona has been created to aid the user centred design process (page 60).



Figure 29. A visual representation of the target market's lifestyle. Adapted from Bloglovin': 2015 & Farris & Akin: 2015 & BuzzFeed: 2015 & Style Estate: 2015 & Fones: 2015

## Product Market Intersection

Llana encompasses characteristics from these three markets to aid active and professional lifestyles. Busy schedules require products which display versatility, comfort and confidence to ease the transition between daily environments. Professional style is of major concern to the target market, which needs to be communicated in the final design.



Figure 30. The WFB by Llana incorporates design elements from the activewear, fashion and outdoor markets. Adapted from Nike: 2016 & Mansur Gavriel: 2016 & GORE-TEX: 2016

### Activewear

Fitness industries have become a metaphor for health, youth, and affluence (Williams & Bendelow, as cited in Wright, O'Flynn & Macdonald, 2006). The forecasted trends for products within the activewear market include the development of fabrics for specific functions. These products have a strong focus on balancing practicality with comfort whilst maintaining an individual aesthetic (Kim & Johnson, 2007).

### Fashion

Fashion brands encapsulate a certain essence or ideal image someone aspires to (Svendsen, 2006). Craik discusses that fashion is not just about clothing habits as it has implications through the practice in which people present themselves (2009). Dress codes are an example of this as they create a social rule that people must adhere to, most commonly in a professional environment.

### Outdoor

The outdoor product market has a high demand for innovative, technical materials for equipment and apparel. These materials work to address the complications that come with extreme conditions (product designer at Mac Pac, personal communication, 8 July, 2015). Specialised activities require durability and functionality such as temperature management, waterproofing and breathability. One of the first major innovations in the New Zealand outdoor textile market was Icebreaker, introducing merino wool (Icebreaker, 2016). Wools technical capabilities appeal to consumers needs (Woolmark, 2004) as well as providing them a natural material option.



Figure 31. A comparison chart showing current gym bag options and the market gap that the WFB will target: 2015

## Existing Market

This comparison chart shows the existing market solutions for users who lead active lifestyles. Gym bags on the market range from inexpensive with a sports aesthetic, to expensive with a designer aesthetic. There is a distinct gap in the market for a mid-high priced bag, that is functional yet sophisticated. Our target users have displayed an aversion to what they call NIKE styling (anonymous Skype interviewee, personal communication, June 30, 2015). This term describes the visual language that emphasises the sports aesthetic; bold often fluoro colours, large logos and cheap materials. Our research confirms that users feel this aesthetic affects their professional image and seek a gym bag that they feel comfortable using in the workplace.

## Market Opportunity

What makes the WFB unique within the gym bag market is the integration of Wool Fresh. While there are a number of bags available which offer a designer aesthetic and quality craftsmanship, there is limited textile innovations offered. Llana will answer consumer needs by providing a bag that balances high end style and advanced performance. It also answers the target market's expectation of products which are more sustainable in its material choices and production.

## Case Studies



Figure 32. The Persu Bag aims to redefine gym bags: 2014.

### The Persu Bag

The Persu bags have been designed for a similar target market to Llana. We looked at Persu to identify how this type of bag was presented to end users and positioned in the product market.

#### Target Market

Style conscious women who lead active lifestyles.

#### Features

Easy to clean, durable nylon exterior.

Drawstring shoe bag and machine-washable bag for storing sweaty clothes (*Persu*, 2014).

#### Market Appeal

Appeals to a wide audience as it provides options for a variety of workout styles.

#### Insights

The Persu collection has successfully used crowdfunding to launch a product as the result of an entrepreneurial venture. People desire a bag that is easy to care for and separates their belongings for hygienic and organisational reasons.



Figure 33. The OG bag by Lo and Sons is stylish, practical and suited to a busy schedule: 2016

### Lo and Sons

The bags produced by Lo and Sons are exemplary for their minimal appearance yet practical and durable qualities. .

#### Target Market

People who need to travel light and look smart.

#### Features

Safe and compartmentalised storage for belongings.

Lightweight, waterproof nylon exterior with leather trim and metal hardware (*Loandsons*, 2015).

#### Market Appeal

The bag can be used for a variety of situations such as gym, overnight, and travelling.

#### Insights

The success of this bag lies in how well executed the balance between function and aesthetic is. The minimal styling appeals to a diverse range of users.

## Approach to Market



Figure 34-36. Content developed for the Wool Fresh Instagram: 2016

The WFB by Llana is the vehicle that introduces Wool Fresh to a product market. In regard to a textile innovation this approach employs a non-traditional commercialisation and marketing strategy. Traditionally, new textiles are showcased at trade shows to attract potential buyers and raise brand awareness. Wool Fresh's approach to market was identified from the client's business plan. He forecasted the use of online platforms in order to gain market traction for the WFB in a short time frame. This ultimately establishes Wool Fresh in the consumer market and develops its reputation as an advanced textile

### Instagram

Included in the initial brief was the task of creating and sharing the Wool Fresh development story and bag design process. This narrative was shared through the increasingly popular social media platform, Instagram (*Wool Fresh*, 2015). This channel of communication was used to create hype, anticipation and discussion around the launch of the Llana brand. One of the intentions of using Instagram was to direct traffic to a crowdfunding platform once the Wool Fresh bag was ready for market. Due to IP concerns the Instagram was discontinued during the second half of the project.

### Crowdfunding

Crowdfunding enables entrepreneurial ventures with limited funding to gain capital fast in order to launch their products. Kickstarter is a common platform for this, however launching a high end fashion brand through a Kickstarter campaign could lessen its perceived quality. As an alternative, a privately hosted website was established to receive crowdfunding.

# Primary Research

This section outlines the key ethnographic methods we employed to conduct primary research. These methodologies facilitated our user centred design approach.

# 04

Ethnographic Methods  
Skype Interviews  
Wool Fresh Testing

## Ethnographic Methods

### Wool Fresh Online Survey

We conducted a global online survey and asked one hundred participants to respond in regard to their attitudes and behavioural patterns around the gym. It was apparent from our research survey that people struggle to find a functional gym bag that caters to their aesthetic preferences. People would often go to work in formal attire and take their gym bag with them. Most frustrations were centralised around compartments being inefficient and the difficulty of storing sweaty sports apparel over the course of the day (see Appendix A for further results).

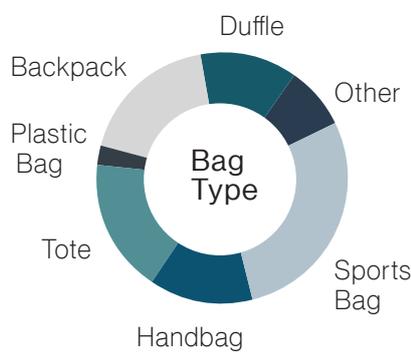


Figure 37. The type of bags respondents used when going to the gym: 2015

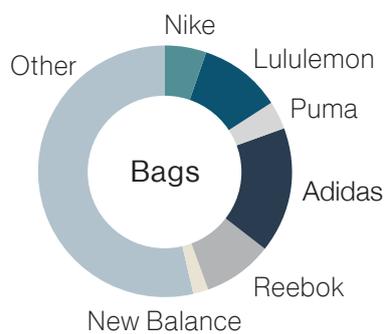


Figure 38. The brand of bags respondents preferred to take to the gym: 2015

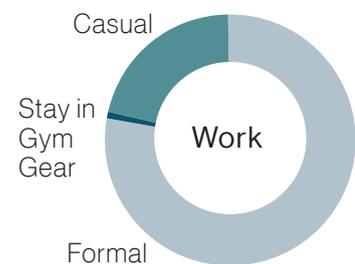


Figure 39. Establishing what kind of apparel respondents wore when they went to work after the gym: 2015

**Q** What frustrates you about your current or previous sports bag and what would you change if you could?

“ Most appealing concept: over the shoulder, all-in-one bag that isn’t too sporty and has some class. ”

Anonymous, Wool Fresh Online Survey: 2015

“ My bag lacks air pockets to allow my clothes and shoes to breathe. ”

Anonymous, Wool Fresh Online Survey: 2015

“ Not nice enough for work and gym ”

Anonymous, Wool Fresh Online Survey: 2015

## Passive Observations

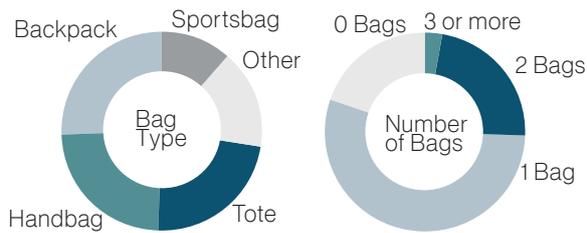


Figure 40. The type of bags people were carrying: 2015

Figure 41. The number of bags people were carrying: 2015



Figure 42. Style conscious bags were indicated by their materiality and classic handbag aesthetic (form, multiple straps, embellishments). Deadly Ponies: 2016



Figure 43. Sports bags were indicated by duffel forms, nylon material, plastic hardware, large straps and branding logos. NIKE: 2016

People's transitional characteristics were recorded from 7.30am - 9am outside inner city gyms in Wellington New Zealand. These observations provided insight into the clothing worn, bags used and other trends that could inform our design. Almost half of the bags observed tended towards style conscious rather than heavily sports branded such as NIKE. Hanington & Martin (2012) stress that people do not always act authentically online. To avoid inconsistencies in our research, we conducted these observations to verify the results from our online surveys. These findings highlighted the need for a bag with an aesthetic that is applicable to more than one activity (see Appendix A).

## Participatory Research



Figure 44. Sensory testing through an interactive blindfold method to understand tactile response: 2015



Figure 45. Exploring design issues through participatory drawing methods: 2015

A focus group styled session was designed to uncover qualitative insights around the area of textile perception and current bags. This was conducted during our first Master of Design critique as we saw this as an opportunity to engage with an audience in order to practice participatory research methods. These methods generated ideas to explore within the next phase of research (Ireland, as cited in Laurel, 2003).

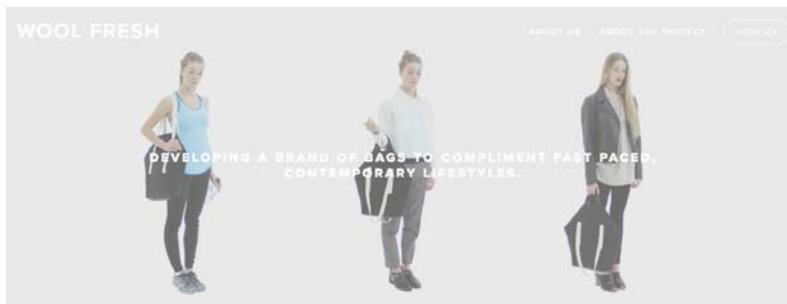
The first method was inspired by the notion that the touch preference of a textile can play a part in the decision to purchase and the overall satisfaction of a product (DeLong, Park & Wu, 2012). We designed a sensory blindfold test where participants responded to several materials with contrasting textural characteristics. We recorded the feelings each material evoked and its connotations. The smooth, soft materials (silk and leather) were well received as they evoked positive feelings and were pleasant to touch. The synthetic, rough and itchy fabrics (mesh) were most unpleasant due to feelings of irritability and uneasiness. Later, these findings influenced the selection of the final bags exterior and lining materials to ensure the product delivered a pleasant user experience.

The second method was a participatory activity used to encourage people to explore issues with their bags. Hanington & Martin (2012) suggest methods other than verbal response is essential to get people to share issues that can be difficult to articulate. Through drawing, the participants communicated that the most important properties of a bag for them was durability, form and size.

# Skype Interviews

Eight American women from the class of 2014, MBA Harvard University were interviewed to verify our bag development direction. To provide the interview content ahead of time a website was created that hosted this information as the interviewees were based internationally. With the intention of receiving feedback on the six prototypes (page 70), short videos communicated details of the bag and the wider Wool Fresh story. These visual prompts made the interviews extremely effective as it created a common point of discussion which Hanington & Martin (2012) recommend to create an effective exchange of information.

We structured the interviews with open ended questions in order to reduce the level of bias and create a more conversational tone. As suggested by Kumar (2003) this enabled greater insight compared to a tightly scripted approach. The interviewees feedback led to a pivotal shift in the concepts and focused further iterations to better suit their lifestyles. Specific elements from these concepts were favoured and incorporated into the final product. The interviewees feedback is referenced throughout this exegesis, however they wish to remain anonymous.



### FULL DAY PROTOTYPES

We have been working to produce a range of options for the Full Day bag. Here we have three separate bags that are designed to look solve a range of different issues you may encounter when moving from workplace to workout. What do you think?

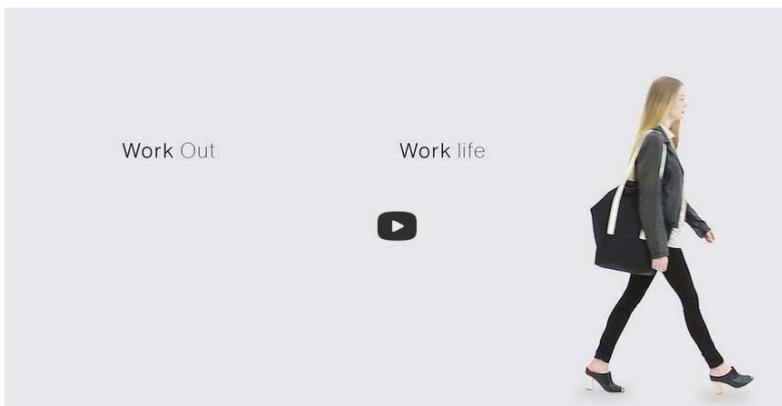
[See more and leave a comment →](#)



### HALF DAY PROTOTYPES

Here we have three initial prototypes that require a lot of feedback to move forward with the refinement of the designs. The Half Day bag concepts explore varying design details and high performance material options.

[See more and leave a comment →](#)



## Reflection

From these interviews it was clear that there were certain features that participants were most attuned to. Interviewees identified a need to separate gym shoes and commonly used a plastic bag for this purpose. This established a preference for a shoe pocket.

Participants found the concept of the Wool Fresh textile interesting, but difficult to understand comprehensively due to the two-dimensional interface. As the intended marketing efforts of the WFB are restricted to online platforms, communication of the performance and benefits of the textile would need to be clear.

Figure 46. A website was developed to receive feedback on bag prototypes from our target market. Wool Fresh: 2015

## Interview Results

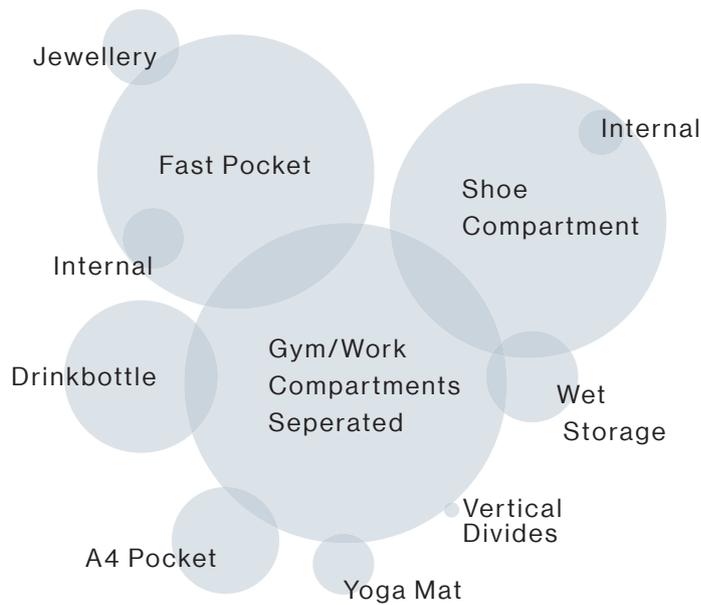


Figure 47. Interviewees stressed the importance of three distinct compartments: 2015

## Compartmentalisation

Key   
 ● Less important   
 ● Very important

Interviewees preferred compartments so that they can organise their belongings in accordance with their daily activities. The need for keeping shoes, gym gear and work items separate resonated with a large number of users.

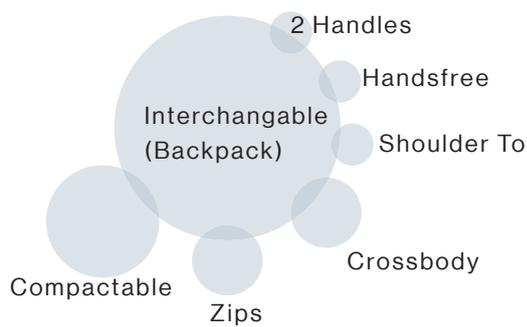


Figure 48. Weight distribution was a key factor that influenced how people felt about using the bag: 2015

## Usability

Key   
 ● Less important   
 ● Very important

Interviewees recognised the importance of backpacks for weight distribution purposes. The practicalities of commuter lifestyles resulted in a preference for the customisable backpack. However, backpacks were not considered appropriate to the workplace or in social settings.



Figure 49. With the exception of leather, users struggled to name specific materials, however they recognised the performance characteristics they preferred: 2015

## Materiality

Key   
 ● Less important   
 ● Very important

Users suggested they desired materials which were lightweight, smooth texture and easy to clean. The participants identified the need for certain areas to be reinforced.

## Wool Fresh Testing



Figure 50. Surinder Tandon, Head Scientist at AgResearch: 2015

## AgResearch Laboratory Results

Contributing to the direction of our primary research was the laboratory testing of Wool Fresh, conducted by AgResearch. This provided a platform of data to inform the method in which our own performance trials were carried out. The first round of lab tests AgResearch conducted were to confirm the textiles performance and success rate. After concluding its effectiveness, discussions were had on how Wool Fresh could be integrated into a bag. A three layered system was mentioned and we went forward to carry out performance trials to test this system.

## Performance Testing

To verify the positive lab results from AgResearch and confirm the functionality of Wool Fresh, the client requested performance trials in context. These findings helped to understand the user experience of a Wool Fresh product and the associated design issues.

A total of sixteen athletes across New Zealand were involved in trialling the performance of Wool Fresh; a combination of university scholarship netball players and sports professionals. A response booklet was developed to establish an effective means of collating subjective feedback from athletes. Users trialled the bag three times and recorded their observations, reflecting how the intensity of odour changed over time (see Appendix A for response booklet). Three control bags without Wool Fresh were included in the trials to compare the active Wool Fresh results to.



Figure 51-52. An example of the trial bags and response booklets used for the performance testing of Wool Fresh: 2015

## Insights

1. The results from the performance trials confirmed the effectiveness by showing an 83% success rate.
2. Performance trials confirmed that this technology would be useful for storing sports apparel.
3. Performance trials reflected the positive lab results and hypothesis of the function.
4. The porous lining (mesh) and non breathable exterior enabled Wool Fresh to function.

**Q** How did this bag effect the odour of your sweaty items?

“ Usually if my clothes sat for that length of time they would smell but they didn’t in the bag. ”

Anonymous, performance trials: 2015

“ It took away the moisture and damp smell. ”

Anonymous, performance trials: 2015

“ Much better than if I kept them (shoes) in a plastic bag. ”

Anonymous, performance trials: 2015

“ It contained and minimised the smell of my items. ”

Anonymous, performance trials: 2015

# Framework for Design

This section will define our framework for design which ensured a systematic and analytical design process.

# 05

User Persona  
Design Issues  
Design Criteria

## User Persona



Figure 53. Becky, our user persona: 2015

Becky is our user persona that we created as an individual representation of the target market, informed by our primary and secondary research. Becky was used as a tool to test, question and analyse our design decisions as suggested by Hanington & Martin, 2012.

Becky has always been passionate about staying active and often goes to morning gym classes. For her, working out is a way to prepare her mind and body for the day ahead. Becky often buys Lululemon gym gear and accessories as she finds what they can do for her really useful. She prefers to take her own yoga mat to gym classes but finds it hard to manage on the Subway.

Becky often meets up with friends after work, or during their lunch breaks. They enjoy visiting the trendiest places around New York that offer healthy alternatives. At times like these, she feels uncomfortable taking her gym bag with her as she knows it will never suit what she's wearing.

At work, her energetic personality is admired by her colleagues. She is renowned for carrying out her role as Communications Consultant with finesse and skill. Becky takes pride of her appearance at work as she believes it upholds her image of professionalism. Caught between going to the gym each day and maintaining her sophisticated look, she draws attention away from her gym bag by carrying a designer handbag.

### Design Issue One

Becky demonstrates a common problem people have of trying to juggle different activities throughout the day. Carrying more than one bag (Design Issue One) aids in compartmentalising belongings, but creates a frustrating situation when transitioning between environments. Appearance is paramount for our target market and a combination of bags never seems to complement an outfit (anonymous Skype interviewee, personal communication, June 30, 2015).

### Design Issue Two

The alternative to Design Issue One is the use of a single bag to carry the items necessary for all three environments; gym, work, and social (illustrated in Design Issue Two). While this aids in moving between places, it makes finding things difficult. Carrying dirty apparel and accessories either a) placed inside another bag or b) placed alongside belongings, can develop an environment where bacteria will thrive and valuables can be damaged. Such unhygienic conditions represent the main issue Wool Fresh aims to address.

# Design Issue One



Figure 54. Design Issue One: Carrying more than one bag is unmanageable. Adapted from Lululemon: 2015 & NIKE: 2015 & DH Gate: 2015 & Spade: 2014 & Sylvester: 2015 & Celine: 2012

# Design Issue Two



Figure 55. Design Issue Two: This visually illustrates the issues that come with using just one bag to carry a variety of belongings: 2015

## Design Criteria      The Wool Fresh Bag

A design criteria was developed in order to prioritise our intentions for the WFB. Three areas; materiality, aesthetic and usability explore the needs of our target user. These parameters were the synthesized results of our primary and secondary research.

|             |                             | Benefits  |
|-------------|-----------------------------|---|
| Materiality | <b>Wool Fresh Textile</b>   | Odour and moisture absorbing.                               |
|             | <b>Exterior Fabric</b>      | Protects Wool Fresh fabric.                                 |
|             | <b>Interior Lining</b>      | Strengthens and protects wool.                              |
|             | <b>Durable Base</b>         | Strengthens base and protects bag.                          |
| Aesthetic   | <b>Refined aesthetic</b>    | Compliments our target user, the active professional women. |
| Usability   | <b>Clear Care Cycle</b>     | User's understand the three layer system.                   |
|             | <b>Fast Pocket</b>          | User's have easy access to their important items.           |
|             | <b>External Shoe Pocket</b> | Specific shoe storage. Other items aren't affected.         |
|             | <b>Sleek Fixtures</b>       | Secures items and streamlines experience.                   |

## Meaning

## Compromise

---

Designated place to store post-workout gear.

-

No extra moisture will enter.

Weatherproof fabric in conjunction with the loft of nonwoven creates an unpleasant tactile response.

Enables optimal Wool Fresh to function.

Limited choice of durable, mesh structured fabrics that are luxurious / high fashion.

Long life cycle.

Requires specific construction methods that will influence overall aesthetic, experience and feel.

---

Appropriate for the workplace and gym.

-

---

Clear communication

Extra cost in developing detailing.

User movements are streamlined due to better organisation.

Security concerns.

Size will be dictated from the larger women's gym shoe.

Gym shoes come in a range of sizes, design needs to cater to this.

User has a frictionless experience with subtle fixtures.

Sleek fixtures may not be durable and could catch on clothing.

# Design Process

The iterative design process focused on establishing the optimal method for integrating the Wool Fresh innovation into a gym bag.

# 06

Conceptual Exploration  
Material Exploration  
Prototype Generation  
Prototype Refinement

## Conceptual Exploration

Conceptual tools can be used to support the creative process and envision possibilities for design (Rhea as cited in Laurel, 2003). Visual inspiration was curated to examine two themes: organic and technical. These themes reflect the natural and scientific qualities of Wool Fresh. Investigating and portraying these themes in the product established its unique character (Emami & Wagner, 2014). To communicate the natural diversity of wool fibres, we examined organic forms and aesthetics. This moved the design process away from traditional bag forms. The exploration of fabric drape directly informed the final concept. To convey the technical, we explored certain design details such as the repetition of form, colour highlights and precise execution of line. From our material explorations it was revealed that the technical aesthetic did not suit our target market and could be communicated in a more subtle manner.



Figure 56. Visual inspiration exploring design language: cyclic, curvaceous and fluid. Adapted from Hajdu: 2015 & Wolff: 2015 & Blaaderen: 2015 & Kuresumi: 2011

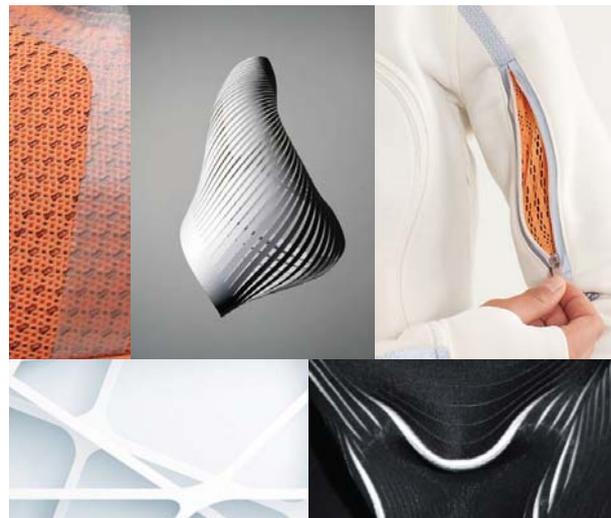


Figure 57. Visual inspiration exploring design language: refined, innovative, advanced and high-performance. Sweeney: 2014 & Nike: 2015 & Van Dongen: 2015 & Grandos: 2014

## Material Exploration

Over one hundred and thirty samples of material explorations proposed techniques for strengthening and improving the aesthetic qualities of Wool Fresh. The following examples demonstrate our process before AgResearch signalled that a three layer system was required.



Figure 58 - 64. A selection of initial material samples: 2015

### Fibre Blend Options

Integrating various fibres such as bamboo into the nonwoven structure, explored ways of strengthening and creating a more luxurious textile to touch. This was later discarded as it reduced the wool content and therefore decreased the functionality.



Figure 59.



Figure 60.



Figure 61.



Figure 62.



Figure 63.



Figure 64.

### **Creating Gradients**

Gradients were explored as an unconventional seaming method. Needle felting the wool into a pre-existing knit or woven material created an organic gradient. This method was not appropriate as the connection between the two materials proved to be weak.

### **Digital Fabrication**

Laser cutting utilised a technical process in order to achieve precise line manipulation of the potential exterior fabrics. This resulted in an organic yet controlled movement. We considered positioning these within a pleat or fold of the bag to articulate movement.

### **Quilting and Stitching techniques**

Adding a surface pattern reinforces Wool Fresh as well as creating aesthetic interest. This technique was deemed inappropriate as it reduced loft and would incur additional costs.

### **Surface treatments**

Utilising unconventional textile materials, such as silicon generated an interesting texture, but would hinder the functionality.

### **Embedding Reinforcement**

One method of strengthening was created by inserting mesh between two layers of Wool Fresh. This inhibited function as the loft was reduced and the connection was weak.

### **Fusing**

Fusible wadding and a range of interfacings increased the fabrics' strength. However, the glue involved in the bonding process reduced airflow, which impacted the functionality of Wool Fresh.

## Three Layer testing

In order for the Wool Fresh textile to function in a bag, AgResearch recommended incorporating it within a three layer system (page 38). Six samples were sent to the lab to determine what combination of exterior and lining materials would provide the optimum conditions for Wool Fresh to function.

## Conclusions

Provided by Dr. Surinder Tandon (personal communication, October 15, 2015)

1. Lab results showed a non-breathable exterior protected the Wool Fresh and enabled its performance. This exterior layer slows the rate of water transmission, allowing for more contact time between vapour and Wool Fresh.
2. The lining material options showed little difference in performance.



Figure 65. Investigating the layered structure by testing methods for joining the lining, Wool Fresh and exterior materials: 2015

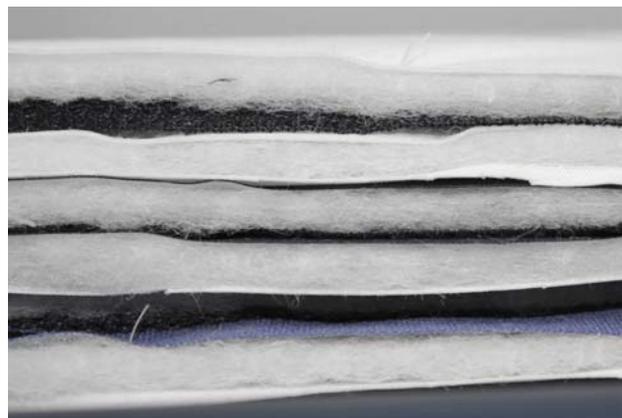


Figure 66. Six samples were sent to AgResearch with combinations of: NBA Eyelet and Sport X Dri-Motion linings. Hydrotex Skinny, Hydrotex Tactel and Coated Nylon offered a range of breathable and non breathable exteriors: 2015

## Selected Layer System

The materials that met both science and design parameters was the Sport X Dri-Motion and a non-breathable exterior. Leather was selected to enhance the bag's aesthetic qualities. This decision was approved by the scientists and also preferred by our users.

# Prototype Generation

Hallgrimsson, (2012) suggests using low fidelity materials like paper to explore initial ideas of form and function through an iterative prototyping process. This allowed for rapid idea generation before moving into other materials to refine details. User centred principles were applied to the creation of forty paper prototypes (Kumar, 2013). These were evaluated against the criteria and revised into six prototypes, each demonstrating a unique feature.



Figure 67.



Figure 68.

Figure 67 - 68. Paper prototypes: first step of bag idea realisation: 2015



Figure 69.



Figure 70.

Figure 69 - 70. The favoured paper prototypes were reverse engineered to produce material iterations: 2015



Figure 71.



Figure 72.

Figure 71 - 72. Material prototypes were analysed through an iterative process to test and refine details such as structure, fastenings, straps and overall form and function: 2015

## Six Prototype Options

The client's initial brief involved the creation of a gym bag and a secondary option that provided the opportunity to trial Wool Fresh at a lower price point. Three concepts for each bag were created to provide a range of options to establish what appealed to the end user. Promising design details from the material samples and the prototypes were included across this concept range. The feedback we received throughout our research identified that the secondary bag was an unnecessary output for this project. The client and project partners were in agreement to the discontinuation of this concept.

Figure 73. The final six material prototypes used to receive user feedback: 2015



## Concept Direction



Figure 74. The final *All in One* concept selected for refinement: 2015

The *All In One* was selected for further development as it resonated with our target market and addressed the requirements of the initial brief. This option showed potential to be minimalist yet functional.

Our Skype interview participants identified the features they were most drawn to; the wide opening of the bag, the separate shoe compartment and the overall form. This feedback also provided insights about how the prototype could be refined. They were concerned with the hardware, compartmentalisation and material choice in terms of colour and durability (page 55).

Using this feedback as a guideline we updated our design criteria to better suit the target markets expectations (page 62).

## Prototype Refinement



Figure 75.

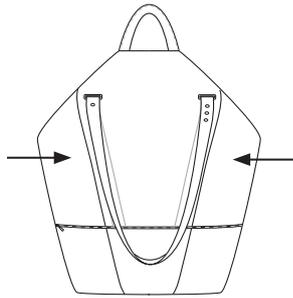


Figure 76.

The first leather prototype showed the overall size needed to be reduced and the gusset removed. Materials: 1.8 - 2mm tan and black leather.



Figure 77.

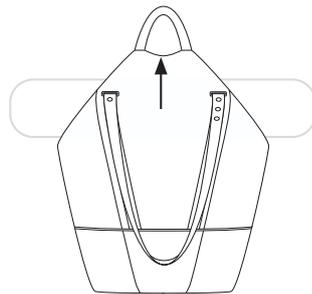


Figure 78.

The top portion of the bag was lengthened to ensure the magnets would meet when a yoga mat was being carried.



Figure 79.

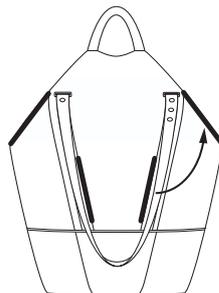


Figure 80.

The fast pockets were moved to a more suitable place to address aesthetic and construction issues. The revised position highlights the edge of the naturally occurring drape.



Figure 81.

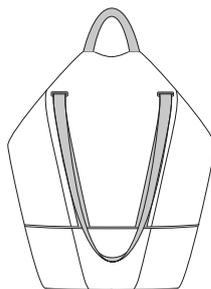


Figure 82.

Several iterations of the straps determined the leather weight, length and stability required. Flat head rivets were used to reinforce weight bearing straps and horizontal stitching was used to further strengthen this high stress area. Three GI studs were placed to enable length adjustment.



Figure 83.

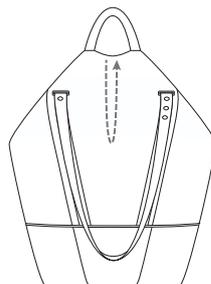


Figure 84.

Reversing the orientation of the main zip meant users could access their laptop quickly. This away-from-the-body zip movement allows for easy access while the bag is being worn.

Figure 75 - 84. Key developments in the iterative refinement process: 2015



Figure 85.

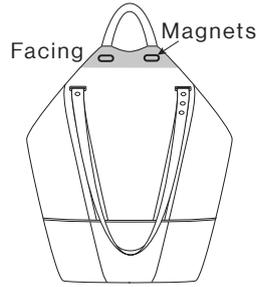


Figure 86.

A leather facing was used around the small handle to give a high quality finish. For secure bag closure, magnets were adhered between the leather exterior and facing. Magnets were chosen for their invisibility and satisfying sound feedback.



Figure 87.

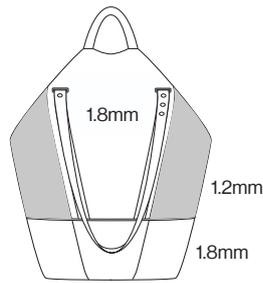


Figure 88.

Structure in the centre and base of the bag was created through a combination of leather weights. This enhanced durability and allowed for a fluid movement when opening.



Figure 89.

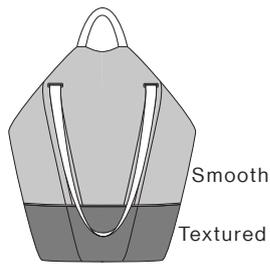


Figure 90.

To balance the aesthetic of the bag, we used two different leather finishes (smooth and grain textured) to add a unique characteristic.



Figure 91.

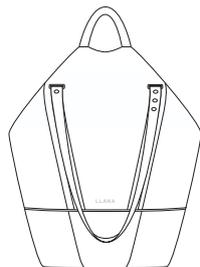


Figure 92.

To complete the bag's aesthetic, a brand mark was developed. This finishing detail was embossed with silver foil on a heated zinc die.

Figure 85 - 92. Further developments in the refinement process: 2015

Figure 93. Progression of the *All In One* refinement to final design; The Wool Fresh Bag by Llana: 2015



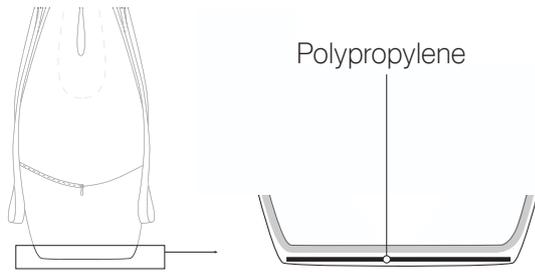


Figure 94. A 2mm Layer of polypropylene reinforces the bag's base and helps maintain the overall shape: 2015

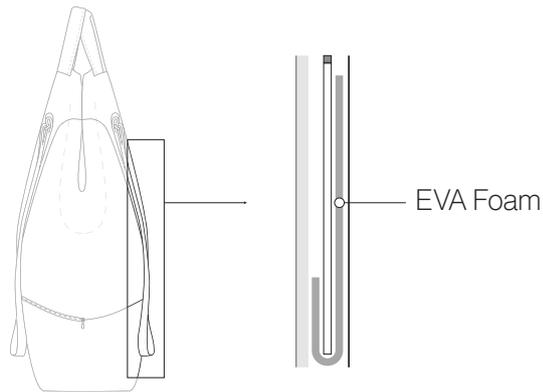


Figure 95. When testing initial prototypes, laptops were prone to damage when users placed the bag on the ground. Padding methods provide the reinforcement necessary reinforcement: 2015



Figure 96. Interior view of final bag showing facings (leather and cotton), lining and bar tacks: 2015

## Unique Construction Requirements

The three layer system (page 38) that underpins the bag's design relied on developing construction methods that enabled the function of Wool Fresh. Maintaining a large surface area ensured maximum odour and moisture absorption capabilities. Widely spaced bar tacks and stitching around the perimeter secured Wool Fresh to the lining. This method preserved the necessary loft and ensured the final construction remained secure. Wool Fresh was cut 10mm smaller than the lining to reduce bulk within the seams. Due to standard construction methods Wool Fresh could not be included under the facing.



# Design Solutions

This section will present the final deliverables for Wool Fresh and Llana.

07

Wool Fresh  
Llana

## Wool Fresh



Figure 97. The two brochures produced to market Wool Fresh. The Tagline for Wool Fresh: 'Nature's Innovation' communicates the brand's underlying conceptual themes: 2015

Branding and marketing content was developed to promote the benefits of the Wool Fresh textile. This presented Wool Fresh as a standalone product to an audience of brand executives, manufacturers and other potential buyers.

Accompanying the brochures was a video illustrating the benefits of the Wool Fresh textile. The video was first shared at a meeting in Japan, by a New Zealand representative from PGGW. The content of the video was planned in collaboration with AgResearch and Darrius.

## Wool Fresh Textile Video

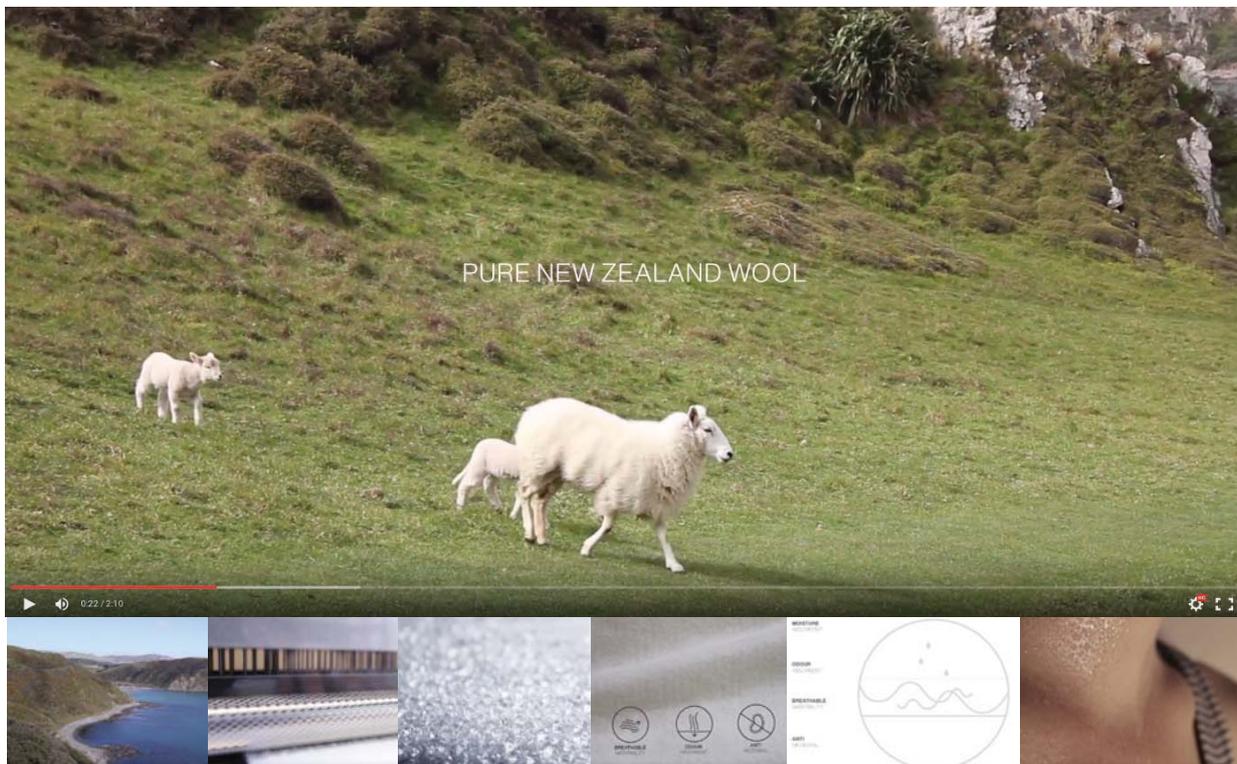
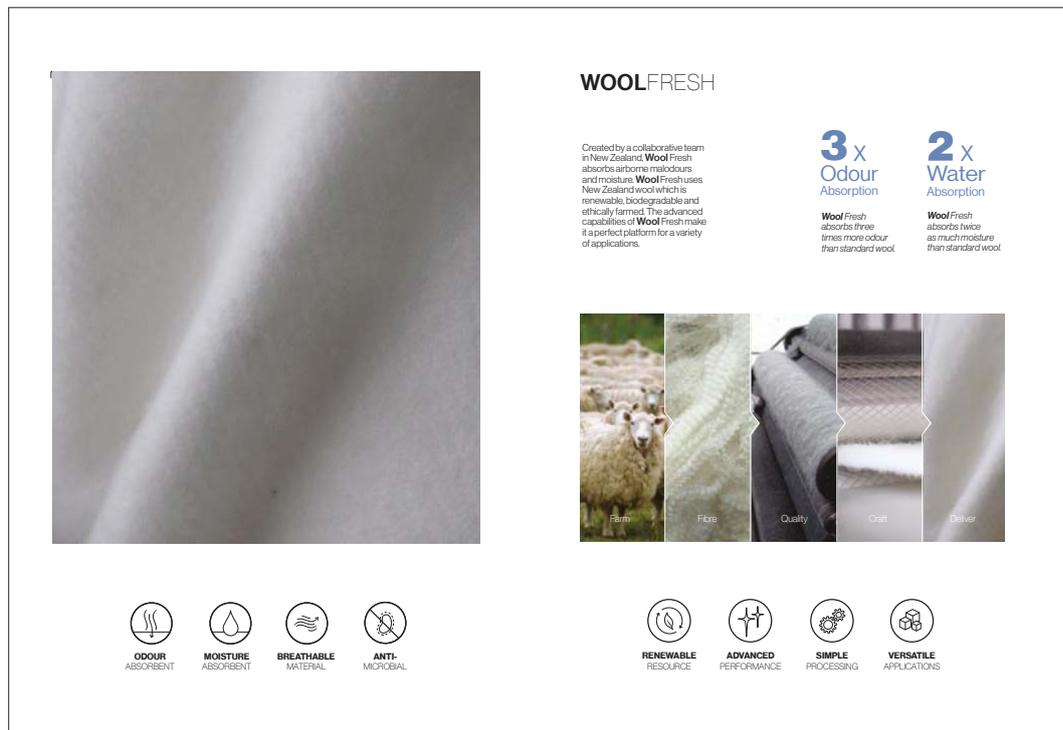


Figure 98. The video illustrated the function and potential applications of Wool Fresh through a combination of animations and contextual footage: 2015

## Textile Brochure



A swatch of Wool Fresh was included to ensure the audience could experience the textile first hand.

Colour and scale was employed to attract readers attention to important information.

A connection to New Zealand allowed Wool Fresh to draw on the country's reputation for quality wool.

Icons were used to visually communicate key information.

Figure 99. Wool Fresh Textile Brochure: 2015

## Design Application Brochure



Isolating the information relevant to brand messaging.

Illustrating how the textile aids the daily transition.

Feedback from user experience of performance trials validates our claims.

Demonstrating one product application of Wool Fresh.

Figure 100. Wool Fresh Product Application Brochure: 2015



Figure 101. Content: 2015

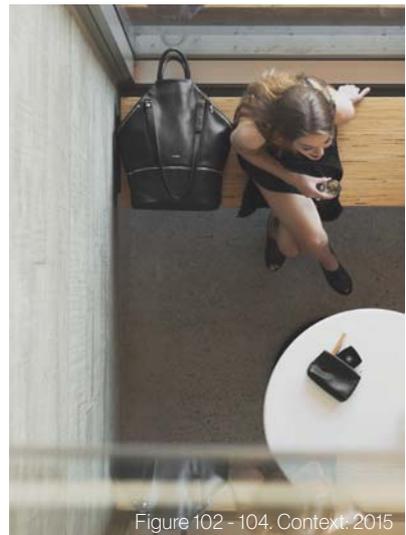


Figure 102 - 104. Context: 2015

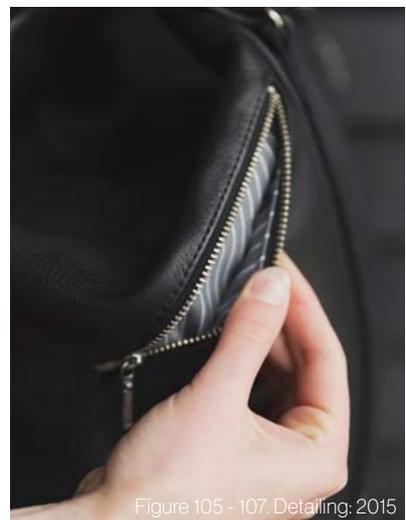


Figure 105 - 107. Detailing: 2015

## Llana

Llana integrates the advanced textile Wool Fresh in a bag that makes transitioning between different environments more manageable. The WFB keeps belongings fresh and dry throughout the day due to its ability to reduce odour, moisture and bacterial activity. Material choices and construction methods have been selected to protect and enhance the function of Wool Fresh.

### Design Aesthetic

The overarching aesthetic of the brand and product communicate a balance between organic and technical influences. A refined, minimal appearance ensures the bag responds to the expectations of the target market. Silver finishes complement the premium New Zealand black leather and elevate the bag to a high-fashion context.

### Form and Function

The organic form enhances the effortless opening of the bag and is aided by the placement of small handles, quality zips and magnets. The unique wide opening allows easy access to the main compartment and assists packing the bag. The long straps and short handles allow for flexibility when carrying the WFB. By selecting one of the three stud positions, users can adjust the strap to the most comfortable length. The compartmentalisation of the bag helps users organise and care for their belongings. The shoe, vertical and fast pockets cater to gym, work and social items respectively, so time spent searching for belongings is minimised. The bag is used intuitively by users through semantic details.

### Material Selection

The leather exterior presents a quality finish and complies with the dress code of the professional environment. A combination of leather weights reinforce the base and allow for the fluid opening motion. Smooth and textured leather, creates a unique point of difference. The pockets have been lined with a material which adds visual interest and allows items to be easily located. This hidden detail creates an element of surprise and speaks quality. The lining of the main compartments is soft to touch and provide a luxurious experience.

### Ensuring Durability

Polypropylene is adhered to the leather base to maintain structure and increase durability. The unique three layer system protects items while creating a luxurious overall tactile experience. The vertical compartment is reinforced with EVA foam to create the protection necessary for laptops and documents. Metal hardware reinforces the WFB's quality, durability and minimal styling.

### Communication

As Wool Fresh is out of sight, a care label is printed on the interior of the bag to bring awareness to the benefits of the textile. It explains the relationship between Llana and Wool Fresh, and unpacks the associated scientific information through relatable icons. This was important to ensure the user understood why it had been integrated into an everyday product, and how they could use the bags to its full potential. The care package promotes the luxury status of the WFB. Provided as a complimentary gift, it is made with the leather waste from the production process of the WFB. An Information card with a textile swatch is included to explain the three layer system and its benefits. New Zealand leather conditioner is provided as a recommendation to spot clean the leather.



Figure 108. Wool Fresh information label. 2015



Figure 109. Care Package: 2015

# Outcomes

In this section we will outline further considerations for commercialising the WFB and textile. Our individual roles in the project are discussed before concluding on the entirety of the multi-partnered project.

# 08

Commercialisation  
Individual Reflections  
Conclusion

## Commercialisation

We have reflected with project partners and Chris Pickering from Leatherworks to develop a set of recommendations for commercialising the WFB. This prototype will require small changes in order for the design to be reproduced by a manufacturing company. These changes relate to cost, material sourcing and manufacturing processes.

### **Cost**

As Wool Fresh is an entrepreneurial start up, the price of each manufacturing run is of concern. The amount and type of leather used will be the primary influence on overall cost. The final prototype was made from deer leather provided by New Zealand Light Leathers. Deer hides are luxurious, high quality, and able to demand a very high price point. Sourcing leather from New Zealand strengthens our marketing story and supports local industries.

### **Material Sourcing**

We have received contradictory feedback about the weight of the bag. While some feel it is too heavy, others suggest the weight is manageable. Further user feedback would be required to determine whether this should be addressed before manufacturing. The weight could be reduced by using an alternative material for the top section of the bag and using plastic instead of metal hardware. However, these options would detract from the overall quality and effect the price the bag is able to demand.

Using black leather will increase the efficiency of the manufacturing process as it should be readily available (C. Pickering, personal communication, December 13, 2015). When purchasing leather for commercial purposes there are minimum batch sizes for each colour run. If the production run was limited to a single colour, the associated cost and sourcing complexities would be reduced.

### **Manufacturing Process**

Certain construction methods would be further refined with the use of specialised machinery. Chris Pickering noted that during manufacture they would firstly prepare the leather using the following methods;

1. Knives specific to the shape of each pattern piece would cut the leather.
2. All edges in seams would be skived to a certain thickness to reduce seam bulk.
3. Pieces that require folding and stitching through numerous layers would be split.

The team at leatherworks would devise the most efficient construction sequence for manufacturing the bag. Chris has suggested the construction could be broken into two parts, before being brought together:

1. Construct external leather shell.
2. Construct internal Wool Fresh and lining component.
3. Bring the two sections together to finish the bag.

## Individual Reflections

### Avara Moody

With a background in Industrial Design, I am familiar with the process of developing consumer products with a user centred approach. Within the team I have maintained creative direction and facilitated the development of a particular research framework that has resulted in a product with innovative value. My understanding of how to design for innovation is what makes my contribution to this project valuable. Throughout the prototyping process I ensured a methodical, iterative approach to refinement. Maintaining perspective and reason affected how my contributions were implemented and enhanced the holistic approach of the project.

#### **Maintaining Creative Direction**

Approaching a new problem, product market and material is standard practice for Industrial Designers when entering an innovation based project. This background knowledge meant I guided the design team when identifying issues and certain research methodologies that would best aid the resolution. To be able to produce a design that is heavily user centred, we needed to systematically understand the wider context of the project (Vanbelleghem, as cited in Baerten & Bauwens, 2013).

Through my observation and influence on the team's dynamic, the project was able to move forward in a creative yet critical manner. In order for the team to achieve a common goal, I facilitated the development of a framework for design. This established the team's intentions when working on separate components of the design and guided the team's collective mindset and awareness of priorities.

Often contributing inspiration from other disciplines maintained a fresh perspective and developed valuable insights within the group. When approaching an innovation led project, it is helpful to have the ability to translate ideas from other contexts to find guidance (Stamm, 2013). One example of this was a Ted Talk by Simon Sinek (2009) who explains why some brands are more successful than others. It helped us devise a common understanding of the importance our core beliefs had on brand recognition.

"Most problem solving requires creative thinking followed by a considerable period of concentrated, focused effort" (Norman, 2004, p.26). To aid the group in transitioning from the highly explorative phase through to the synthesis of ideas, I encouraged constructive debate and discourse. This creative abrasion (Hill, 2014) enabled contrasting points of views to be discussed as opposed to endless passive brainstorming. My ability to affect the group's productivity levels resulted in rich and exciting design ideas and possibilities (Hill, 2014).

#### **Designing Product Value**

To successfully integrate the Wool Fresh technology into the target market it was essential that the product was valued by its users. It required uncovering how to influence style conscious women to desire an advanced textile within the high fashion consumer context. Llana's core values and beliefs needed to be conveyed through the product and all channels of communication with the users. I managed the creative direction of the touchpoints throughout the project which the users would interact with. Within this role I was responsible for Woolfresh.com, the Wool Fresh Instagram and the visual communication elements of various outputs. I aided the team in developing prioritised messaging to communicate key information. These principles extended to influence the aesthetic of the bag and connect with the brand's image to ensure cohesion (Emami & Wagner, 2014).

I outlined a research and empirical basis for understanding how people respond and value a product, on a number of different levels. There are three levels of processing when developing a perception of a product: visceral, behavioural and reflective (Norman, 2004). Norman's concept influenced my ability to balance these contrasting factors to design a product which appealed to the target market. The visceral judgement is a fast response and concerned with the physical features of the product: what the bag looked, felt and sounds like. The behavioural was concerned with how the bag worked and how rewarding this experience was. At the reflective level a positive overall impression of the bag was important to

develop. The self image, emotional connotations and the cultural meaning of the bag and how this would relate to the users was considered to inform design decisions.

### **Research Framework**

"The interaction of qualitative and quantitative studies within an entire research project is a dance of expansion and contraction of possibilities, but always moving toward an optimized design" (Laurel, 2003, p.68). Within this Masters of Design we needed to develop methods to understand social issues, business and marketing strategies and how to create value (Laurel, 2003). I facilitated a framework for research methodologies to develop a user centred design perspective. A balance of qualitative and quantitative methodologies ensured we would understand our issues and create a design criteria and persona with these insights. This developed empathy, creativity and rationality within the design team, these attitudes ground the popular term, 'Design Thinking' (Vanbelleghem, as cited in Baerten & Bauwens, 2013). We used this research to find creative direction and make justified decisions.

When working with innovation, there needs to be a balance between the analytical and intuitive mind when making decisions (Willebois, 2012). I understood that to develop an authentic, innovative concept, we initially needed to take a non-linear approach to the problem (Valcke, as cited in Baerten & Bauwens, 2013). We needed to remain dynamic in our creative practice to ensure we developed a product that was distinctive from other bags on the market. The process known as "exploring the fuzzy front end" (Rhea, as cited in Laurel, 2003 p.145) was employed to suspend initial judgement to explore wider possibilities. Allowing time and space for this unrestricted process enabled genuine creativity to flow freely through research and making. Here, the bags organic nature and fluidity of the opening movement was discovered.

### **The Prototyping Process**

I find prototyping is the best method to solve a design problem. It eliminates the uncertainty of a drawing and guides you to discover the most suitable methods and practices (Hallgrimsson, 2012). Prototyping was used as a tool for communication, and encouraged collaboration through the need to reflect upon the design. Physical interaction highlighted what the real issues were that need to be resolved, which could easily be overlooked during a sketch or verbal discussion (Hallgrimsson, 2012). I encouraged the need to develop as many iterations as we could in a given time frame and pushed us to refine to high standard with the resources we had available.

I was aware of the importance of a material or medium for each iterative phase. Material and colour would influence our perceptions and the conclusions we drew from making each prototype. Beginning with inexpensive, familiar materials to explore form and use motions rapidly and easily was effective to quickly generate ideas. Through the manipulation of paper, I developed the form of the bag which the Llana bag embodies. This gives credibility to the organic method of working, as this unique opening motion resulted in being one of the most appealing features of the design.

During the refinement phase I established and communicated to the group the features of the bag we were testing and which materials might be best to use. This created a methodical approach to refining the prototype and ensured that a balance of function and style was achieved. At the forefront was my concern for the user's response to the tangibility of the bag. My contributions toward the final finishing details of the bag were necessary to elevate it to a high end fashion context. I sourced the silver hardware and produced the foil emboss brand mark to ensure the brand image remained consistent throughout. From the pocket placement to the finalised typeface, each finishing detail I directed to resonate with the target market.

Working with an entrepreneurial venture introduced complex factors into the design of a product. As the project focus shifted, the product design development process was put to one side. This break in the product design restricted our timeframe, but it also created space for the synthesis of ideas. If the focus remained solely on the product, sourcing a wider range of options for materials and hardware would have been an option. Due to our location time and cost parameters this was difficult.

## **Personal Approach**

Throughout the year I have communicated a realistic perspective of the deliverables we needed to develop in the given time frame. I stressed the importance for a high standard of resolution when refining details of the bag as I understood how these could affect the overall perception of the product.

Communicating design options to the interdisciplinary team in a constructive and personable manner ensured positive morale was upheld. This was possible by providing an unbiased view on how we might make a decision, using the previous research findings to justify and validate. This meant there was a positive, yet highly critical way of moving through complex problems. The confidence of the design team increased with the progression of the project. Being able to justify our design decisions with our research enabled us to better control the process and communicate with the project partners.

My overall strength throughout this project has been the manner in which I generate and execute ideas with a holistic approach. My creative direction throughout the project has enabled the cohesion of the design team and an innovative resulting product.

## Annabelle Fitzgerald

With a degree in fashion design, the skills and experience I have brought to the interdisciplinary design team are foremost in terms of the practical creation of design artefacts. As the designer responsible for the construction of The Wool Fresh Bag (WFB), I have demonstrated my strength in the prototyping process, resolving design issues and providing a critical yet reasoned voice. My approach to research responds to certain iterative and immersive methodologies. This reflection will demonstrate my focused roles within this project and explore how I have adopted techniques from other disciplines to create a holistic design approach.

### Integration of Disciplines

Through the transdisciplinary platform that our Master of Design project presented, each designer was able to utilise and integrate their knowledge to construct a versatile approach. As Poggenpohl and Satō state "Individuals are increasingly aware of the limitations to their knowledge and skill in a complex technological and increasingly interactive world" (2009, p.138). In order to create solutions to the problems presented in this increasingly complex world, a multidisciplinary approach is critical (Astella Saw, 2014).

Our individual design approaches were shaped by the daily exchange of ideas and strategies within the studio environment. This cross-pollination of expertise enabled the unique insights and outcomes our research presented. We developed a sound understanding of each discipline and adapted techniques that enabled richer solutions. The collaborative design framework inspires interdisciplinary perspectives to be employed so that unique approaches to issues can be executed (Poggenpohl, Satō, 2009).

### Iterative Process

My holistic approach proved very beneficial to the progression of the prototypes into a viable design. When critically analysing the concepts I articulated a balanced view of benefits and concerns to the design team. This aided sound reasoning for change and justified certain developments. A primary role of mine was to translate the creative direction into the material prototypes. During concept ideation my ability to foresee appropriate materials and construction methods enabled the design team to progress in an informed direction. I selected the most appropriate methods based on the knowledge that user experience would not be hindered and that the technique was well suited to the materials we worked with. In order to ensure fluid navigation I adopted an efficient yet flexible prototyping process, enabling me to integrate and test a range of ideas.

I problem solve through physical exploration and sampling. This enables me to critically reflect upon and further manipulate a process in order to generate a unique outcome and technique. This method of research through design substantiates the cyclic nature of design inquiry as it consistently draws conclusions that influence the next progression with a comprehensive understanding of the context (Burdick as cited in Laurel, 2003). I utilised this methodology during the iterative process as I conducted a series of pattern, material and construction samples in order to make justified insights. While each sample generated possibilities, I evaluated these in regards to balancing function with aesthetic. Ensuring any functional element proved not only its purpose, but also resonated with the brand ethos.

The nature of an iterative design process is often non-linear, as each idea is analysed, redesigned and tested (Zimmerman as cited in Laurel, 2003). The iterative cycle presents opportunities, but by no means does the methodology confirm that the latest edition will be the most successful. I found that reflection and consideration of prototypes in context was crucial after each development and sometimes resulted in the need to integrate an earlier idea with the most current. I implemented methodical systems to document each iteration, so that coming back to re-engineer a previous idea was possible.

### Approach

"Seeking *whole* knowledge is a balance of what is *true* (scientifically provable) and what is *real* (the experience of a person), and directs the designer to developing a deeper felt sense for, and understanding of, their user" (p. 422, McDonagh, 2015).

In order to eliminate any preconceptions that may have hindered a purely user-focused outcome (Donahue as cited in Laurel, 2003), I maintained an immersive research stance outside the research office. This consistent inquiry led to unexpected discoveries and deeper insights into our target users' lifestyle. My practical approach provided a method to further test the research findings that were a result of our contextual analysis. This proved the authenticity of the project and enabled user perceptions to influence the direction. McDonagh, (2015) has noted this research method as a recent phenomenon in design research practice, shifting towards an intimate understanding of the user through personal immersion.

My attention to detail and avid concern for high quality emulates through the luxurious finish of the Llana bag. As a result of my perseverance during the iterative process, I was able to ensure meticulous execution of each bag component. My tendency towards perfectionism as a designer was useful in this regard as my patience with planning and construction ensured the bag was finished to a high quality. With the intent of demanding a high price for an innovative product, consumers must be able to see its superiority. As the perceived quality of a product is based upon individual judgment of its overall excellence (Zeithaml, 1988), the quality of the WFB will be determined by its aesthetic and functional qualities, underpinned by the unique construction and innovative materials. I resolved construction issues to ensure industry standards were met. This means that commercialisation is a viable option for the WFB as it has been designed in a way that reproductions would be possible in a manufacturing setting.

My approach to design research is heavily influenced by my introverted personality. The design team and client have noted the benefits of my contemplative process in that it provided impactful insights. I allowed more time to listen and process in order to consider any problem in depth. These characteristics assist the design process by enhancing the ability to problem solve, think creatively and aid conflict resolution (Cain, 2012). Introversion influences my design and research approach as I find success during reflective mental and physical inquiry. The quiet leadership I have contributed to the design team has provided an insightful balance to the group dynamic.

## **Communication**

I maintained the ongoing correspondence with AgResearch, specifically reporting to Dr. Surinder Tandon. My knowledge of textiles and mathematical ability allowed me to translate textile jargon and scientific data into phrases and statistics that the rest of the design team could understand and further manipulate into a visual format. In order to create a common language between the interdisciplinary design team, my ability to translate this information eased the accumulation of terminology.

When communicating with the project partners, I acted as the team's diplomat. I am able to voice concerns in a constructive way that leads to a positive resolution. This was important as meetings happened infrequently due to the geographical spread of partners. I was able to clarify new knowledge during such meetings and this ensured the efficiency of project development, and professional working relationships with partners.

To support our design inquiries I initiated meetings with professionals to gather their perceptive insights. My diligence in this regard enabled us to integrate expert knowledge into our practice. Discussions that I had with academics, skilled technicians and colleagues established new ideas that were taken into consideration. This approach was necessary to ensure deep exploration into as many avenues as possible. Without allowing the research to diverge and delve into various arenas, new frontiers wouldn't be discovered (Rhea as cited in Laurel, 2003). In an effort to ground our research and ensure justified direction took place, I sought this expert knowledge in order to build upon their insightful recommendations.

**Conclusion**

Within the collaborative Masters of Design project Wool Fresh, my individual approach as a designer has added value in terms of experience and personable qualities. My unique approach to problem solving is aided by my contemplative characteristics. I conduct in depth inquiries into problems in order to analyse all possible implications. Concerned with how the resolution of the problem will be perceived, I foresee aesthetic and functional qualities that I take into consideration during the analytical process. Through this collaborative research project I have adopted techniques from other disciplines, research methodologies and consequently formed a holistic approach to design.

## Amy Blackmore

My contribution to this Master of Design research focused on developing and executing systems that enabled efficient collaboration with project partners. I was also responsible for the communication of key information to consumers. The Wool Fresh framework of transdisciplinary collaboration contained various partners that contributed to a depth of knowledge which was reflected in the deliverables of this project. Drawing from Spatial design practice and personality traits has informed my approach to connecting the technical and experiential qualities of this Master of Design research. Consideration for user experience in relation to space and object is not only central to Spatial Design, but also underpins other disciplines. This prior knowledge underpins my approach to design as I am attuned to the relationship people have with objects and space.

### **Systems for Collaboration**

The limited timespan, multiple project partners and standard of deliverables demanded clear and concise ways of working. I filled the role of project manager within the design team, putting systems in place early to facilitate an efficient and focused process. This ensured nothing was overlooked and limited the possibility of repeating tasks, which created the frictionless progression we maintained throughout the project. Preparation allowed us to work organically within the framework of scheduled milestones and deadlines, which further ensured a positive group dynamic. Mowery (1998) has identified that the process of collaboration itself, does not guarantee the production of successful innovation. The systems that facilitate effective collaboration, directly contribute to the quality of its results (Mowery 1998).

The deliverables of this research have been strengthened by the overarching success of our group dynamic. The different approach of our individual perspectives resulted in balanced and justified outputs. A natural system of collaboration quickly emerged as we developed a common language and adapted learnings from our previous studies to suit this approach. At each milestone, we shaped the initial ideas about content, atmosphere and key points through comprehensive discussions. The team valued my ability to extract the essence of such discussions and translate it appropriately to external parties. I divided tasks according to the individual's prior knowledge and a cohesive approach was maintained through constant consultation. Without the organic success of the designers collaboration and our instinctive understanding of user centred design, the outcomes for Wool Fresh and Llana would be vastly different.

### **Project Partners**

I acted as the primary point of contact for the client and other parties of the wider Wool Fresh framework. Providing a singular voice that represented the design team helped to consolidate information from the various project partners. After discussing issues collaboratively, I would convey our conclusions to external parties. This enabled clear communication which ensured the design perspective was understood by the project partners and we responded to their requirements in turn. I ensured the relationship between the design team and project partners remained open, transparent and positive. This effective communication contributed to the overall success of the designers collaborative efforts. I contributed to the common basis of understanding that was created between project partners. This streamlined conversations and reduced the complication of communicating through Skype and email. My understanding of the parameters and demands of each facet resulted in design decisions that considered scientific, economic and manufacturing perspectives as well as the final consumer.

### **Gathering Feedback**

I added value to the process of gathering feedback by my ability to communicate, summarise and articulate the project's content to academics, users and representatives from the media. When communicating with users I established ideas efficiently and directed conversations with flexibility. I made each respondent feel comfortable and gave them time to consider their answers in depth. This uncovered quality insights during Skype interviews and design critiques, which was of primary importance for analysing design decisions. The layout, content and methods we used to conduct such interactions were directly impacted by my ability to articulate the position of the design team.

A lifelong involvement with the agricultural sector gives me a unique understanding of the factors that affect wool production and the culture that supports it. Understanding the various organisations associated with the wool industry was eased by this connection. The client identified the value this added by noting that I streamlined further interactions with industry experts outside the Wool Fresh organisation (D. Glover, personal communication, January 12, 2016).

## **Messaging**

A specific set of challenges were associated with launching the WFB by Llana, as the route to market was limited to online platforms. My role included the planning and execution of video and visual material that the client requested to assist his commercialisation strategy. Transparent communication and the development of community is required to inspire an emotional response from potential consumers (Laroche, Habibi, Richard, et al, 2012). My understanding of the audience, messaging and software capabilities ensured the ideas we generated collaboratively could be executed to their full potential. As the target markets for Wool Fresh and Llana are different, the resulting expectations differ. I adjusted the projects visual deliverables to accommodate these markets perspectives and create a common basis for discussing the benefits of the Wool Fresh innovation.

While creating content for our target audience, I maintained a user perspective throughout the planning and editing process to ensure the brand messaging was in line with the market preferences. The focus of our messaging is to communicate the Wool Fresh story in a way that inspires an emotional response from potential consumers. When this is attained, we know we have achieved the ultimate design challenge of humanising a new textile innovation. Our target market responds to non-invasive, peripheral messaging over traditional marketing approaches (Egan, 2007), so the overarching aesthetic was controlled and refined. The atmosphere of videos, brochures and web content, centralised user experience and our respect for natural systems. By leading with our core values, we can connect with like-minded individuals who are interested in innovation and quality materials (Egan, 2007).

“Even visual perceptions are fused and integrated into the haptic continuum... as the very locus of reference, memory, imagination and integration” (Juhani Pallasmaa, 2012, p.12).

I employed visual and sensory techniques to communicate the physical properties of the WFB and textile over 2D interfaces. When conveying the properties of Wool Fresh, I employed macro videography and sensory indicators to prompt haptic recall (Pallasmaa 2012). I created an animation that explained how Wool Fresh functions, which proved particularly valuable. The website [www.shopllana.com](http://www.shopllana.com) will be the primary influence on consumer response to the bag's aesthetic, functionality and social implications (Crilly, Moultrie, & Clarkson, 2004). I applied principles of visual hierarchy when creating content for the site as 55% of people spend only 15 seconds on each web page (Soskey, 2014). The use of diagrams, photos and videos, combats this issue and keeps viewers engaged for longer. I refined and implemented these principles in a more frequent and targeted way, such as through the Wool Fresh textile and application brochures and final product experience video.

## **Conclusion**

My contribution to enabling systems for collaboration and communication has added value to the research, design and commercialisation strategy of Wool Fresh. The successful dynamic of the design team underpin the entirety of this research and reinforces the importance of collaboration between industries and academia. Principals from Spatial Design and a rural background have informed my approach to connecting Wool Fresh and human experience. My perceptive nature ensured the perspectives of the wider research collaborative were integrated into the deliverables for this Masters of Design. Combining expertise from a variety of disciplines has enabled the success of Wool Fresh, Llana and this design research.



## Conclusion

The objective of this research project was to redesign the gym bag for sophisticated, style focused women. Through integrating an innovative wool based textile, the Wool Fresh Bag (WFB) was designed to aid the transition between daily environments. With a unique form and story, the bag achieves more than a regular gym bag. Its multipurpose design is underpinned with scientific innovation and provides a superior function. The final bag demonstrates the findings of the research and is presented to the client as material to kickstart his entrepreneurial venture.

The Llana brand was developed by the design team to demonstrate one of the possible applications of Wool Fresh. The WFB by Llana was the result of user centred and interdisciplinary design research. These methodologies enabled the critical analysis of the theoretical framework that explores the interaction between science and design. This research approach allowed us to effectively collaborate with industry partners, AgResearch and Texus Fibre. Design parameters were established with industry partners, then explored through an iterative process. A creative and critical approach was employed to develop an innovative, user centred product.

### **Product Application**

This research has resolved complex issues and identified opportunities surrounding the application of Wool Fresh. A unique method for integrating the nonwoven Wool Fresh textile into a product has resulted from the collaboration between textile scientists and Master of Design students. This is demonstrated through the three layer fabric structure that forms the WFB.

Two additional layers surround Wool Fresh and are necessary to enhance its performance, yet have implications for design and manufacture. The material combinations can be customised to the intended product application, but they need to adhere to the parameters of the three layer system. The system works in one direction to control the transmission of moisture vapour. It must inhibit moisture from penetrating the exterior, while assisting the absorption of moisture vapour from the internal surface. Construction methods employed by new product applications must reinforce and maintain the loft of Wool Fresh. The design of the product must allow Wool Fresh to cover the largest surface area possible.

This research demonstrates the importance of design in the application of Wool Fresh. It has provided groundwork for other brands that are interested in applying the innovation to their own products. In order for them to develop valuable, innovative products, it will be important to consider these parameters. Wool Fresh offers the competitive advantage of a low cost renewable resource with efficient manufacturing process.

### **Creating Demand**

This research contributes to the future of Wool Fresh through establishing how to create demand for the innovative textile within a product market. Llana offers the WFB to a target market who require a combination of high-end style and function. The bag resonates with the lifestyles of women as it enhances their active lives, without compromising their sophisticated image.

Llana transforms consumers expectations of advanced textiles by applying them in an unorthodox manner. This research has shown that the target market is familiar with textile innovations in the sports and outdoor apparel market. They are interested in the functionality, yet are hesitant to invest in these products due to their bold, active aesthetic and wider connotations. The WFB caters to women who appreciate the benefits of high performance textiles but desire a style focused solution. The research output successfully integrates technical innovation and high fashion. This user centred approach has effectively answered the lifestyle needs of the target market, increasing the value of the WFB and consequently, Wool Fresh.

### **Collaborative Success**

Expertise from the designers interdisciplinary backgrounds contributed valuable perspectives to this research project. The cohesive dynamic of the team resulted in constructive creative discourse. The individual strengths of each designer were recognised and contributed to the overall design approach. The collaborative aspect of this project created the opportunity to regularly analyse design methodologies and processes, resulting in a holistic solution.

The design team has contributed to a wider collaboration with industry partners, in which successful and professional interactions have taken place. Communicative tools were developed to enable productive relationships due to the partners national and international locations. Material was displayed primarily through visual formats such as videos, diagrams and presented through online platforms. Skype was used to meet with industry partners and communicate with an international feedback group.

The collaborative success of the project is measured by the outcomes and interactions of the research project. The interdisciplinary design team provided an energetic, youthful approach to wider design issues faced by industry today. Leveraging off the existing practice and knowledge of the industry partners has allowed the design team to develop a commercially viable product in a short time frame. The partners willingness to openly collaborate has enabled a successful working relationship. In addition to the free flow of information, the partners showed generosity and patience towards new ideas suggested by the design team. This allowed for constructive and innovative ideas to be formed collaboratively. Together, a network of professions can solve issues which were once too diverse to address.

### **Outcome**

The WFB is presented in a refined manner in order to ease commercialisation efforts. Small changes can be made at the client's discretion, to tailor costing, material usage and finishing details. During the course of this research, the WFB underwent a meticulous development process resulting in considered design which enhances user experience. The success of this research project and realisation of the WFB would not have been possible without the support of the industry partners and the generosity of wider New Zealand companies. This Master of Design research offers a fresh perspective to the traditional New Zealand strong wool industry.

# Glossary

|                       |   |                 |   |
|-----------------------|---|-----------------|---|
| Dimensional stability | Ability to retain size and shape through use and care.  | Nanoscale       | Having or involving dimensions of less than 100 nanometres.         |
| Die                   | Zinc metal stamp used for hot foil embossing.   | Non Breathable  | Fabric that does not absorb water or let water vapour pass through. |
| Facing                | Fabric applied to inside edge (traditionally of a garment) in order to create a neat edge.                                    | Nonwoven        | A fabric that is made directly from fibres.                         |
| GI studs              | Metal screw in stud.  | Raw Wool        | Shorn, unscoured wool.  |
| Gusset                | Piece of fabric that adds breadth to a space and folds back in on itself when area is closed. This reduces stress on an area. | Scouring        | The process of washing raw wool.                                    |
| Interfacing           | An adhesive fabric that is ironed onto other fabrics in order to add strength.  | Strong wool     | Wool that is over 33 microns.                                       |
| Fusing                | Joining materials through the application of heat.  | Skive           | The removal of bulk from the underside of leather.                  |
| Hydrophilic           | Fibres with high moisture absorbency or regain.   | Split           | Split leather skin to a thinner weight.                             |
| Hydrophobic           | Fibres with low moisture absorbency or regain.  | Knife (Leather) | Press blades that are shaped to pattern pieces used to cut leather. |
| Hygroscopic           | Fibres with high moisture absorbency or regain and remain dry to touch.   | Wool Clip       | The annual crop of wool.  |
| Micron                | One millionth of a meter. The number of crimps in a micron of wool fibre influence how it is graded.                          | WFB             | The Wool Fresh Bag  |
| Microporous           | Referring to a material containing pores with diameters less than 2 nanometres.   |                 |   |
| Nanoparticle          | A microscopic particle with at least one dimension less than 100 nanometres.  |                 |   |

# Figure List

Unless otherwise identified, all images have been produced by the Wool Fresh design team; Amy Blackmore, Annabelle Fitzgerald and Avara Moody.

Figure 1 - 2. Bonny Iris Photography, 2015. Model Xanthe Whitely, KMB. Edited 2016

Figure 3. Bonny Iris Photography, 2015

Figure 4. Authors own Image, 2015

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# Appendix A

Research Data

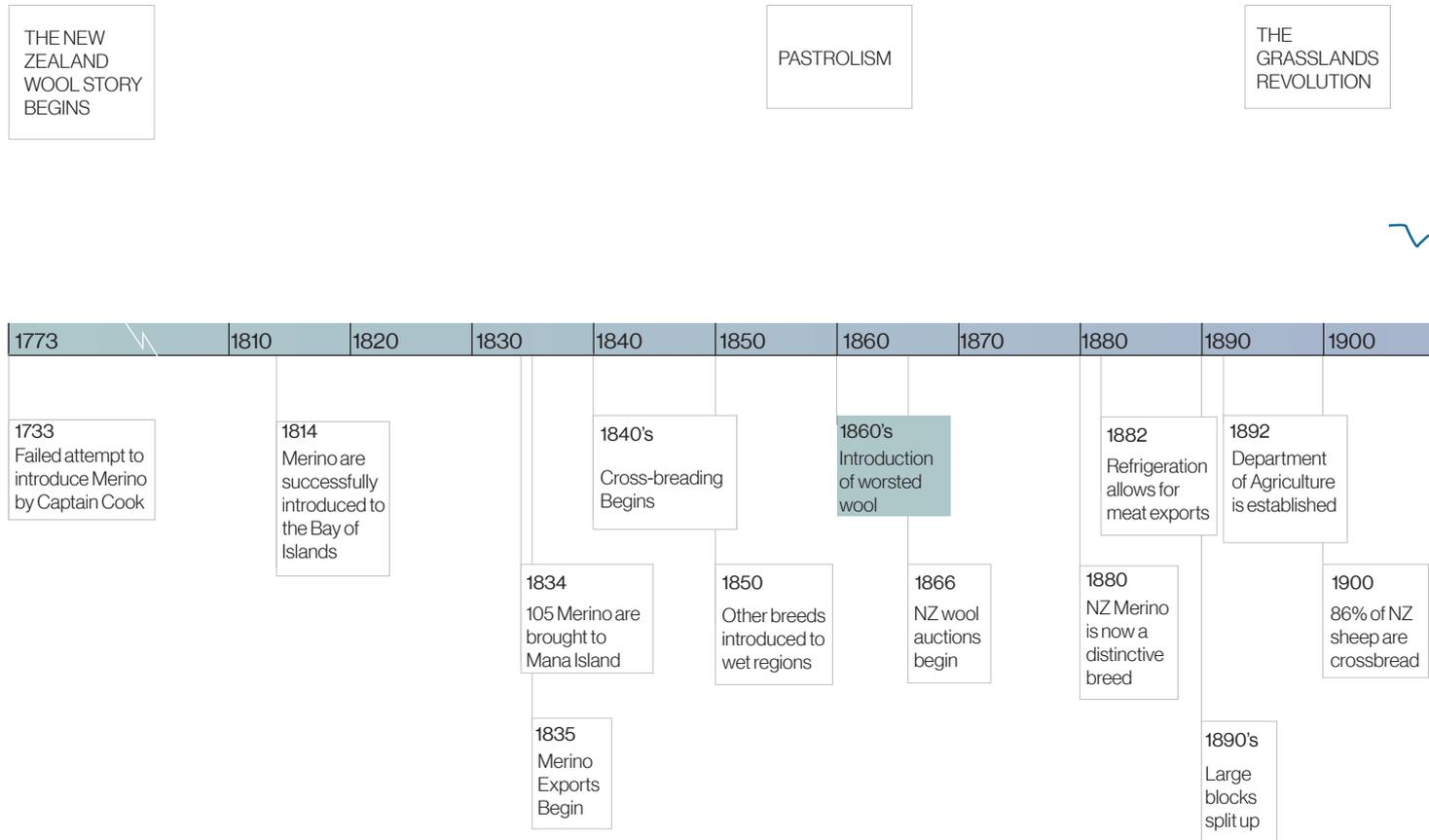


# Comparison between Protein and Synthetic Fibres

| Protein Fibres (Wool) |   | Synthetic Fibres (Polyester) |  |
|-----------------------|---|------------------------------|--|
| Properties            | Importance to Consumers                                     | Properties                   | Importance to Consumers                      |
| Resiliency            | Resist wrinkling. Fabrics maintain their shape.             | Resiliency                   | Easy-care. Resist Wrinkles.                  |
| Hygroscopic           | Comfortable, protects from humidity in cool, damp climates. | Dimensional stability        | Machine-washable.                            |
| Weaker when wet       | Wash with caution. Wool loses about 40% of its strength.    | Sunlight-resistant           | Good for curtains and draperies.             |
| Flame resistance      | Self-extinguishing  | Durable, abrasion resistant  | Technical uses, sewing thread, work clothes. |
|                       |   | Aesthetics superior to nylon | Blends well with other fibres.               |

The comparison between the main properties of Protein and Synthetic Fibres, and the impact this has on consumers. Adapted from Kadolph, 2010.

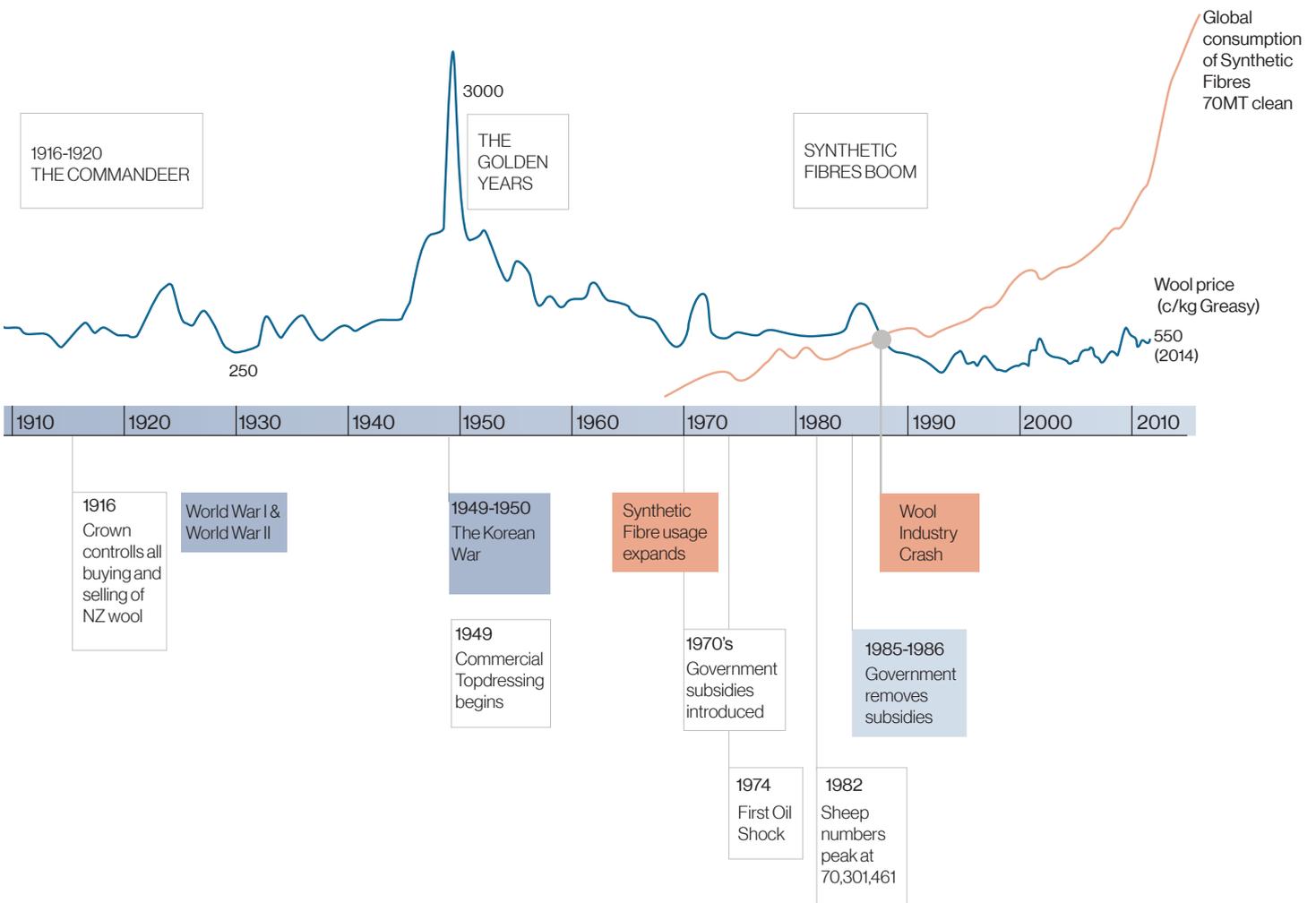
# Wool Industry Crash History



# Wool Branding Initiatives



One example of New Zealand's branding initiatives (2011)



# WOOLFRESH

WOOLFRESH

**Wool Fresh** is a team of designers and scientists developing a brand of bags. These bags will help you transition throughout the day. The design team is based in Wellington and would appreciate any comments you have to offer. As this is part of our Masters of Design project, any feedback you provide will be used for academic purposes. If you have any questions or queries about the trial, please feel free to email [amy@woolfresh.com](mailto:amy@woolfresh.com) or ring 02040012399

This trial is purely functional! Please ignore the materials and how the bag looks.

## Instructions

- Step 1 Take this bag with you to training / workout.
- Step 2 Train / workout as you normally would.
- Step 3 When you are finished, place your used apparel, shoes, injury supports and / or sports braces inside the **Wool Fresh** Bag. Complete part A of question 1 and 2.
- Step 4 Seal the bag while you complete questions 3 - 6.
- Step 5 Complete part B of questions 1 and 2.
- Step 6 Please keep your items in the bag for over 5 hours, if possible (E.g overnight or while you're at work/un).
- Step 7 When you need to remove your items for washing or your next training, please complete part C of question 1 and 2 as well as question 7
- Step 8 Repeat for each of the three trials and then answer the general questions at the end of this booklet.

## Trial One

Question 1



Smell the exterior of the bag. How bad does it smell at the following times?  
(1 being no smell, 10 being very strong)

- A) When you put the items in  ① \_\_\_\_\_ ⑩
- B) After 5 Minutes  ① \_\_\_\_\_ ⑩
- C) When you return home  ① \_\_\_\_\_ ⑩

Question 2



Smell the opening of the bag. How bad does it smell at the following times?  
(1 being no smell, 10 being very strong)

- A) When you put the items in  ① \_\_\_\_\_ ⑩
- B) After 5 Minutes  ① \_\_\_\_\_ ⑩
- C) When you remove the items  ① \_\_\_\_\_ ⑩

Question 3 Level of activity Low High  
 ① \_\_\_\_\_ ⑩

Question 4 Length of time spent training or working out

Question 5 What are you putting inside the bag?  
\_\_\_\_\_  
\_\_\_\_\_

Question 6 What is the fibre content of the garments?  
\_\_\_\_\_  
\_\_\_\_\_

Question 7 How many hours did you leave the items inside the bag? (5 hrs is recommended)

1 2 3 4 5 6 7 8 9 10 11 12

WOOLFRESH

## General Questions

Do you think this bag helped reduce the odour of your sweaty items?

\_\_\_\_\_  
\_\_\_\_\_

What do you usually use to store your training gear and has this bag made any difference?

\_\_\_\_\_  
\_\_\_\_\_

What sort of bag did you put it into? (If any)

\_\_\_\_\_  
\_\_\_\_\_

What did you do with the **Wool Fresh** bag when you got home?

\_\_\_\_\_  
\_\_\_\_\_

Was the size suitable for your needs?

\_\_\_\_\_  
\_\_\_\_\_

Did you feel the need to wash it? Yes / No

WOOLFRESH

## Any further comments?

\_\_\_\_\_  
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## Thank you

Thank you for participating in our user trial and providing your feedback. If you are interested in what we are doing, please follow us on instagram. [www.instagram.com/woolfresh](http://www.instagram.com/woolfresh)



## Response booklet

Users were asked to carry out three separate workouts and store their gear in the bag provided. We asked them to fill out a survey that targeted the amount of sweat generated and the strength of odour in the bag. The former was measured directly after their workout and compared to the smell to after a long period of time. This test was subjective as responses are based on athletes perceptions of odour. Instructions were provided on the opening page, three trial sections (pictured left as 'trial one'), and a place to leave comments further.

|    |                     |  | Overall effectiveness 1-10 | Trial 1 | Trial 2 | Trial 3 | Level of activity | How much did you sweat? | Desire to wash it? |
|----|---------------------|--|----------------------------|---------|---------|---------|-------------------|-------------------------|--------------------|
| 1  | CONTROL - Untreated |  | 1                          | 5,5,8   | 7,7,8   | 7,7,8   | 7,8,9             | 7,9,10                  | no                 |
| 2  | CONTROL - Untreated |  | 6                          | 3,6,3   | 2,6,5   | 3,7,4   | 5,5,7             | 5,7,6                   | no                 |
| 3  | CONTROL - No Wool   |  | 3                          | 1,5,6   | 3,6,-   | 3,7,8   | 7,8,7             | 6,8,6                   | -                  |
| 4  | Non Breathable      |  | 7                          | 3,2,2   | 3,3,3   | 2,2,2   | 8,10,5            | 7,9,5                   | yes                |
| 5  | Non Breathable      |  | 5                          | 6,4,2   | 7,5,3   | 1,1,0   | 8,5,3             | 4,6,2                   | yes                |
| 6  | Non Breathable      |  | -                          | -       | -       | -       | -                 | -                       | -                  |
| 7  | Non Breathable      |  | 5                          | 0,9,4   | 0,7,5   | 1,7,6   | 7,5,6             | 7,5,6                   | no                 |
| 8  | Non Breathable      |  | 3                          | 6,4,8   | 3,6,3   | 1,8,3   | 8,9,9             | 7,9,6                   | no                 |
| 9  | Breathable Skinny   |  | 6                          | 3,3,4   | 2,2,4   | 2,3,5   | 8,4,6             | 9,6,7                   | no                 |
| 10 | Breathable Tactel   |  | 8                          | 0,0,0   | 1,1,0   | 0,0,0   | 7,6,7             | 7,8,6                   | no                 |
| 11 | Breathable Tricot   |  | 7                          | 1,2,4   | 2,4,7   | 0,2,6   | 8,9,7             | 9,9,6                   | no                 |
| 12 | Breathable Tricot   |  | 8                          | 4,6,3   | 6,6,1   | 1,-,4   | 6,10,7            | 6,8,7                   | no                 |
| 13 | Non Breathable      |  | 5                          | 5,5,1   | 10,10,6 | 4,4,2   | 8,10,5            | 7,9,5                   | no                 |
| 14 | Non Breathable      |  | 8                          | 1,2,2   | 7,2,3   | 3,3,3   | 4,7,4             | 4,7,4                   | no                 |
| 15 | Non Breathable      |  | 10                         | 0,3,1   | 2,4,0   | 0,2,1   | 6,6,9             | 7,8,8                   | no                 |
| 16 | Non Breathable      |  | 6                          | 8,8,5   | 6,4,4   | 6,4,4   | 8,7,7             | 8,6,6                   | no                 |
| 17 | Non Breathable      |  | 2                          | 2,2,7   | 1,5,8   | 1,6,8   | 9,9,-             | 9,9,-                   | no                 |

## Comments

"I didn't really notice any change in the odour of my clothes"

"(My clothes) didn't smell as much but smelt differently"

"Bag smelt of wet wool/sheep most times but clothes generally came out not smelling as bad"

"Yes it was perfect size to fit shoes and was not too big for my training bag"

"Took away the moisture and damp smell"

"This product is a great idea however it's more hassle than it's worth. Can just put clothes in the wash."

"Much better than if I put them in a plastic bag"

"It contained and minimized the smell of my items"

"Usually, if my clothes sat for that length of time they would smell but they didn't in the bag"

"Normally I put my training gear in a plastic bag in my gym bag and yes it made a difference"

"It was great and seemed to take the odour out of my clothes the longer they were left they seemed to smell less(nicer)"

"Removes sweat (moisture). Sealed bag is effective. Odour control"

"The shoes were wet. Drying the shoes out and removing odour. It was dried out completely - after 12 hours."

"It was surprisingly effective"

"Very impressed at the reduction in smell"

"The bag doesn't smell, whereas a plastic bag would used for this purpose."

"It definitely masked the pungent punch my shoes would normally throw"

"It essentially deodorised the gear".

"The Wool Fresh bag removed the moisture and that's the best thing - really helps."

"It was great and took the odour out of my clothes. the longer they were left they seemed to smell less(nicer)"

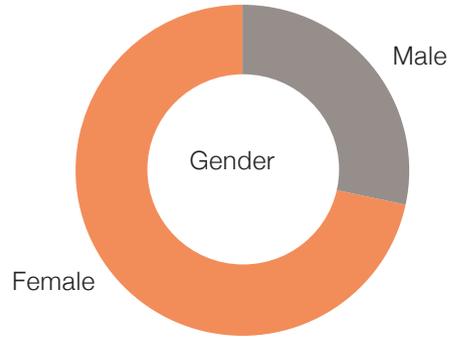
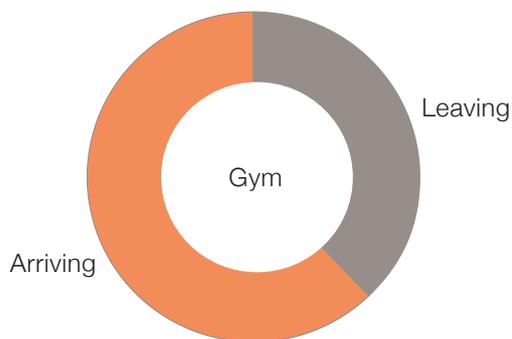
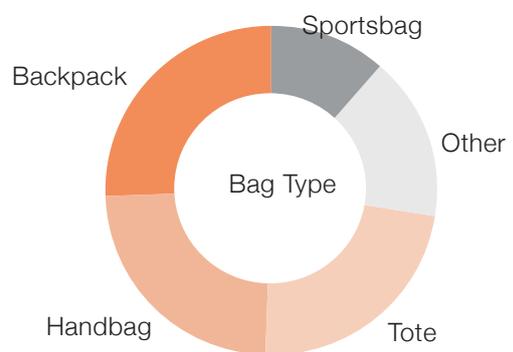
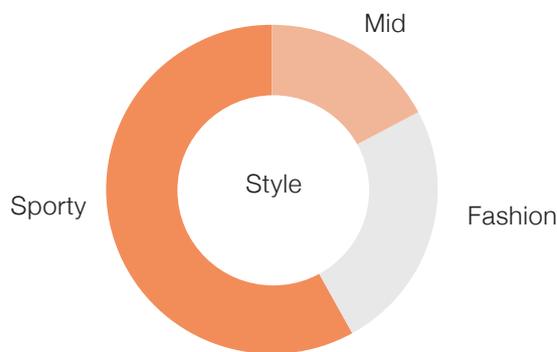
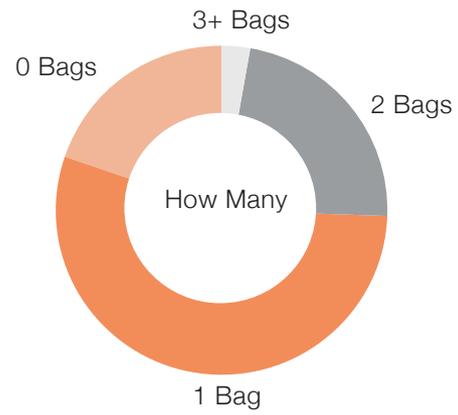
"Usually, if my clothes sat for that length of time they would smell but they didn't in the bag"

"The best thing about Wool Fresh is that it deals with the moisture and smell from sweaty gym gear. The moisture is absorbed which is great, as the main problem people have storing gym gear is that it stays damp."

"The main problem people face storing sweaty gym gear is that it stays damp all day. The Wool Fresh bag is great as it absorbs the moisture and leaves both bag and items deodorized."

# Street Observations

Passive observations took place outside three gyms in central Wellington. Particular note was taken of the accessories that facilitated people's interaction with this environment.





## Online Survey

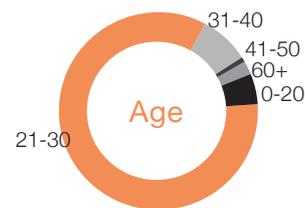
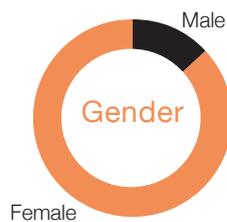
Wool Fresh Online Survey: Sports Bags  
<https://www.surveymonkey.com/home/>

We conducted an online survey on 28.01.15. This was to gather insights on the use of sports bags. We received one hundred responses from 87% female and 13% male. More than 80% of respondents were between the ages of 21-30.

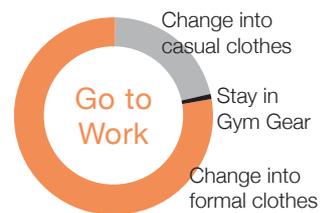
Over 40% of people used a sports bag. Other popular bags were backpack, tote, handbag and duffel respectively. To identify consumers requirements of a gym bag, we asked them what they did with their gym gear after leaving the gym, depending on where they were going next.

From these results we identified that more than 80% require a suitable storage area for their gym gear as they continue on their day. Most people would not have the time to return home and put gym clothes in the wash. We asked about sport brand preferences, items people need to take with them and their preferred methods of compartmentalising. As we were most concerned about how people store damp and smelly gym gear, we asked how people addressed this. 45% washed their entire bag, 35% didn't wash it, or would use a disposable plastic bag for smelly gear. With a comment box, we heard people's frustrations about storing this gear. Users felt it was wasteful to use plastic bags but they felt there was no other option. This response was particularly interesting for us as it confirmed the need for a bag that addresses moisture and odour.

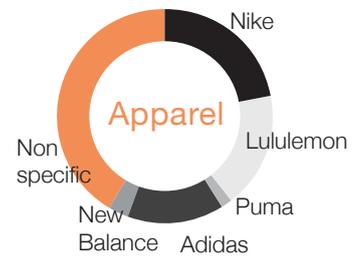
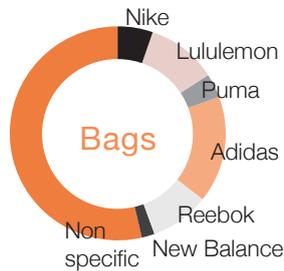
Results  
**107**  
 Survey Monkey.com



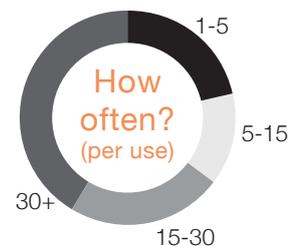
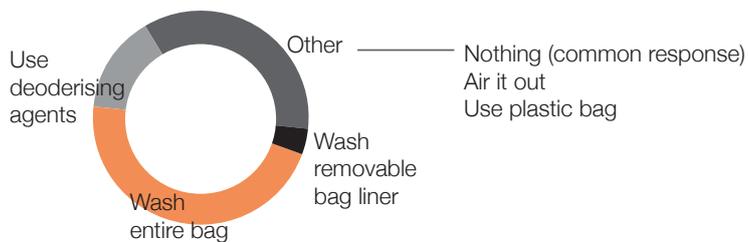
What are people most likely to do if they:



## Brands preferred when buying:

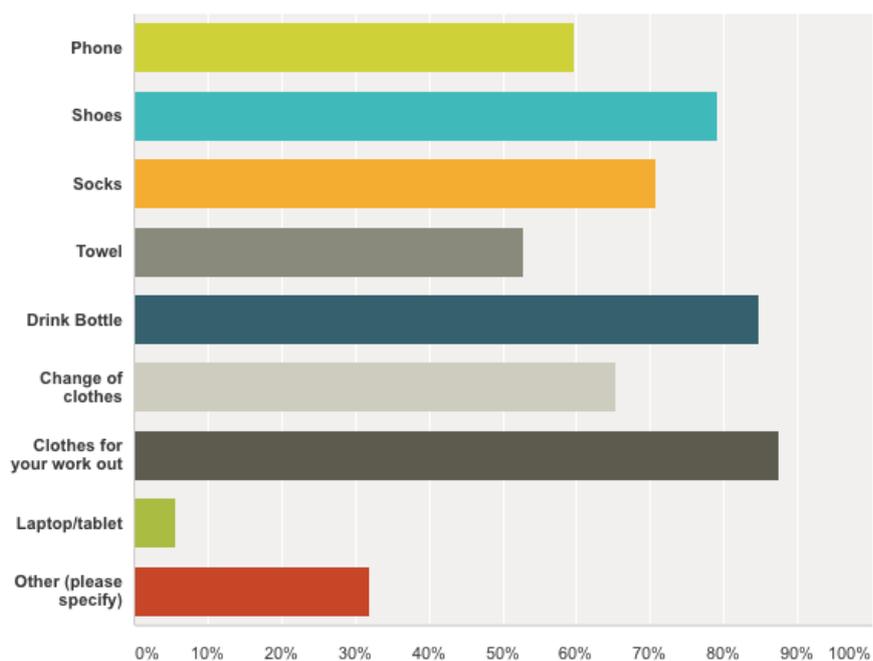


## How do people keep bags odour free?



## What do you usually have in your gym bag?

Answered: 72 Skipped: 28



## Skype Interviews Feedback

### Pockets

#### Desired Features

Separate shoe pocket - with exterior access.

Drink bottles must remain vertical - interior.

Hard pocket for jewellery.

Fast pockets are important for both bags.

Security - zips on pockets.

### Insights

Users lifestyles are fast paced so they must be organised and efficient

They work long hours.

Pocket placement must streamline daily movements

- No rummaging through the base.

The fast pocket must consider access to subway tickets, phones, headphones and cards.

Personal presentation, social status and hygiene is important to the target market.

Creased work clothes will detract from their professional image.

Shoes are perceived as extremely dirty and may contaminate work clothes or documents.

Specific laptop pockets are important for the majority of interviewees.

Due to the culture of pickpocketing in large urban settings, our users are concerned about the security of their possessions. They will sacrifice style for added security.

### Usability

#### Desired Features

Interchangeability.

Customisation.

Considered weight distribution.

Foldaway concept.

### Insights

Interchangeability was well received over the 2D online interface.

Weight distribution is more important than having their hands free.

Weight, volume, ergonomics and stress point are considerations that we should test.

Backpacks aren't fashionable, but would still be used depending on weight and social context.

Users liked both backpack and cross-body customisation options.

Users also liked the foldaway feature.

## Materiality

### Desired Features

Wool is seen as cheap and unrefined  
Lightweight.  
Waterproof.  
Easy to clean.  
Looks good.

### Insights

Users had a negative response to exposed wool as it is seen as cheap and aesthetically unrefined.  
Users understand that the value of wool is in its function.  
Material swatch is misunderstood and needs to be shown to people before they get it.  
People aren't aware of specific fabric types, but know that they require a lightweight, easy to clean material that is waterproof, but doesn't feel like a raincoat.  
People like the look of leather, but consider it hard to clean.  
People want a smooth, 'crisp' material that is pleasurable to the touch.

## Aesthetics

### Desired Features

Security.  
Structure.  
Formality.  
Appropriate colour choices.

### Insights

Materiality and colour are the primary indicators of formality.  
Financial and client facing jobs require more formality, whereas creative, or casual working environments allow for colour and experimentation with form.  
There was a lot of negative reaction to a long, rectangular shape.  
Security cannot be sacrificed for the sake of form and aesthetic.  
We need to be aware of age, seasonal or situational connotations connected to form. E.g Beach Bags.  
Laundry Bags.  
School girl connotations.

## Colour

### Desired Features

Dark Base.  
Appropriate for work.  
No pink or 'Nike' styling.

### Insights

People make colour choices based on how easy / hard the colour is to keep clean.  
No light colour on the base as this would stop them purchasing the bag.  
A 'pop of colour' is ok if it's neutral, but any pink, fluro, or overpowering colour is not.  
'Nike styling' is seen as garish and inappropriate for our context.  
Dark colours are seen as formal, and easy to care for. However, people are looking for a bag that adds a splash of colour to their otherwise dark wardrobes.

## Care Cycle

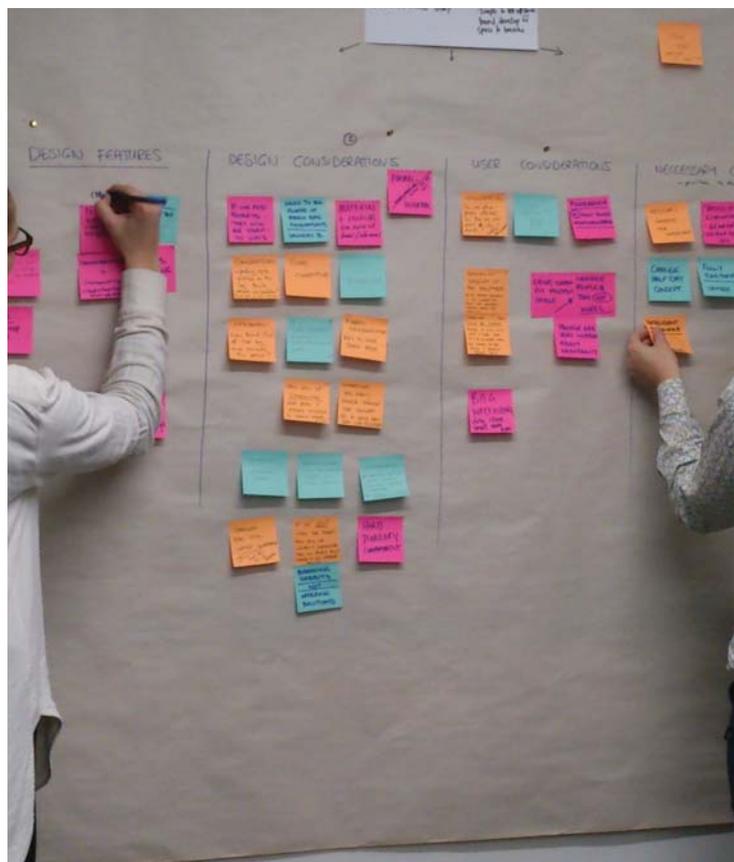
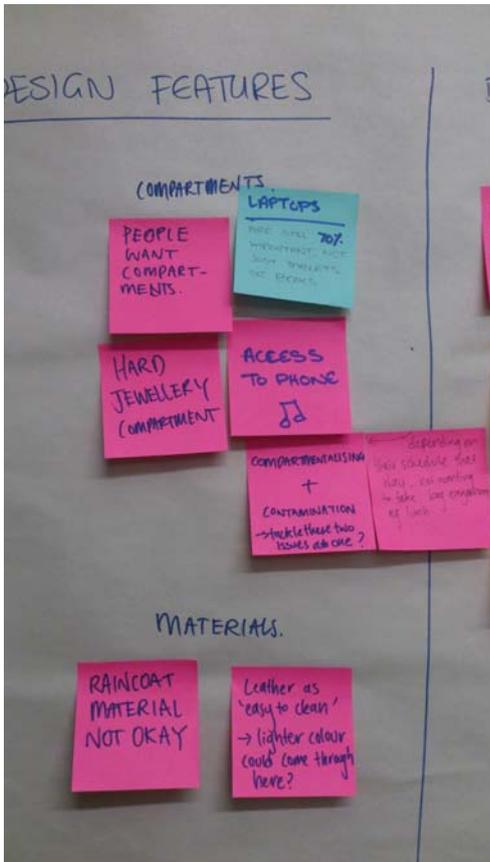
### Desired Features

Care package.  
Clear cleaning instructions.  
Crisp, clean, professional image.

### Insights

People were more interested in the care-cycle than we assumed they would be.  
The bag's base is a point of practical focus and is viewed quite differently to the rest of the bag.  
People would find it hard to break the habit of using a plastic bag for their shoes.  
We must create a great way to convince people the Wool Fresh fabric works, as there is some scepticism.  
We need to clearly communicate the fact that they can't wash the Wool Fresh fabric.  
Some said trailing the material for themselves would be the only way to convince them that the textile works.  
People may be inclined to throw it in a washing machine anyway.  
Perhaps we supply a care package which includes:  
Material layer swatch, Leather care, (spot) cleaning instructions  
This will enhance the crisp, clean, professional image that surrounds the bag.

# Skype Feedback Analysis Process



# Skype Feedback Analysis

The shoes being totally separate not having to touch the clothes, I'm a little mad about that - I have an issue of having everything together.

I would like to a small pocket for the keys, wallet anything I need to access.

I like the first bag and having one big bag to carry everything.

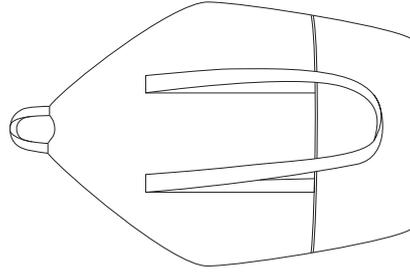
I actually like the shape of the top one. I mean how does the shape restrict what can go in there? Otherwise I'd rather have a typical square bag.

Its a really unique shape and not something that you usually see - so that would definitely be the first thing that I would notice.

I liked how wide (Option A) opened

If I can also put my laptop in the notebook pocket, that would be really great.

I liked how the fold over had a slight angle to it, it also had a nice striking look



The All In One Option A

## Key Quotes

Having a portable yoga mat section is really amazing

I almost never use the handles where you're just carrying it in your hand

I thought it was really different, easy to take and hold.

The main reason why I liked option A the best was because it had a totally different pocket for the sneakers

Colour 3 looks a bit surveer

The colour in the middle is a bit too casual, it sort of looks like a canvas beach bag

I wouldn't go to a meeting with that bag. If I had to go to a client meeting wearing a suit and all that probably not. Given my kind of job my kind of meetings are really formal.



Positive Mentions

III

Negative Mentions

I

III

III

II

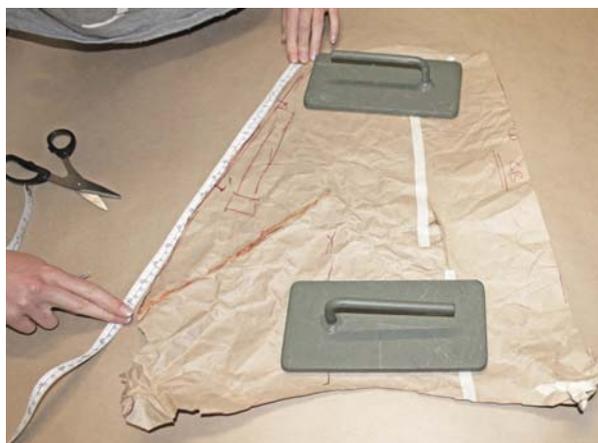
# Appendix B

## Design Process

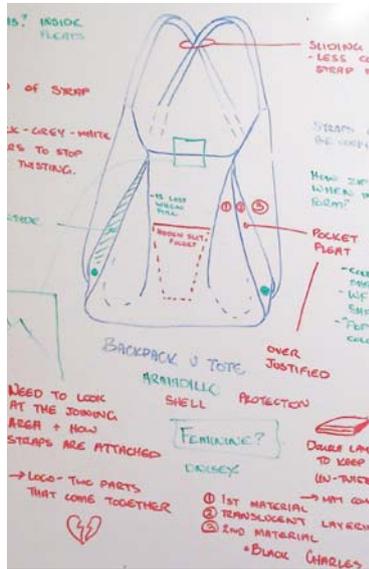
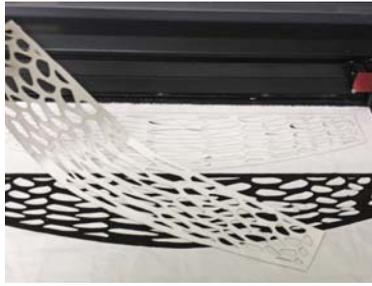
## Concept Generation



A selection of the paper prototypes produced, exploring size, form, style and overall function.



The favourable paper prototypes were reverse engineered to produce the respective material iterations.



Material prototypes were analysed and iterations carried out to test and refine details such as structure, fastenings, straps and overall form and function.

# Brand Identity Development Llana

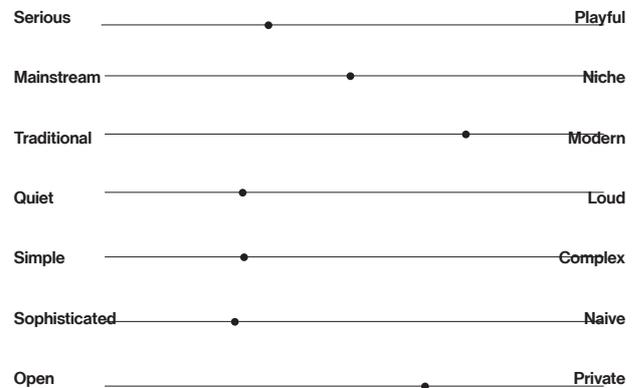
## Wool Fresh Sub - Brand

6 November 2015

### Values and Qualities Research and Directions Visual Language

This Sub Brand utilises the innovative textile produced by Wool Fresh and incorporates this into a bag design. It is the first sub brand of Wool Fresh which demonstrates how the advanced textile can be utilised. This Sub Brand of bags will be launched in a Kickstarter campaign initiated by the CEO of Wool Fresh, Darrius Glover. The brand identity and visual language will be used to inform the content created for the kickstarter campaign, other PR material required for marketing purposes and details of the bag design itself. This sub brand must successfully integrate the Wool Fresh textile into the commercial market.

## Brand Character



## Name Generation

- Ebb & Flow    Llana
- Aether        Stowe
- Imbue         Ellery

## Competitors Word-marks



## Visual Direction



## Values and Qualities

Balance  
Integration  
Understanding  
Natural  
Respect

Revival  
Innovation  
Simplicity  
Materiality  
Innuendo

Through re-introducing a natural focus into an urban environment. Providing a natural based alternative to synthetic materials that are commonly used for technical textiles.

