Minimal Running Footwear.

A case study in ‘enabling design’/ reid douglas for tobe:
This Thesis is submitted to Auckland University of Technology for the Degree of Master of Art & Design, (Product).

Reid Allan Douglas
Bachelor of Art and Design (hons) (Product)
Minimal Running Footwear: A case study In enabling design.
January 2013

Attestation of Authorship:

‘I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of a university or other institution of higher learning, except where due acknowledgement is made in the acknowledgements.’

_______________________________
January 29 2013
Acknowledgements:
I would like to thank the business partners at 'Tobe:' Tim Brown and Michael Wilson, for their support and advice. Also, Jamie Mclellan for the expertise shared during my summer internship.

Abstract:
A dramatic shift in how we design is required in order to move toward sustainable production and consumption. Such a paradigm shift is daunting and often seems inaccessible to young designers. This conceptual exploration of minimal running footwear is a case study in developing a personal sustainable framework termed 'enabling design.'

It is claimed that design purely for comfort and convenience is having adverse affects on our planet. 'Enabling design' focuses on how behavioral change might encourage pragmatic approaches to sustainability such as design for disassembly and stewardship schemes.

This thesis maps my journey through an early research phase, concept development process and project evaluation. This is a highly visual document that draws four key reflections around, design process, design research, industry learning and enabling design.
Research Question

How can product design enable sustainable living in the field of minimal running footwear? Specifically exploring user behavioral change, design for disassembly and stewardship schemes.
Young designers have been confronted with an interesting tension: respond to the mandate for radical, sustainable change, while developing industry standard design skills. Confronting sustainability in product design often seems unrealistic and somewhat overwhelming for both professional and student designers. This masters project has sought to develop a tangible design outcome that responds to the need for pragmatic, more sustainable solutions in the chosen field of minimal running footwear.

‘Our dependence on convenience is at an all-time high’ and is having a direct impact on the well-being of the planet (Dioffa, 2012). My focus has been on how design might foster behavioral change, and encourage more resilient and sustainable attitudes in a product user. Morelli (2007) argues that comfort and convenience based design disconnects a user from the skills and knowledge that are vital for sustainable living. How might design enable a transition to more sustainable, empowering interactions with products? Can product design act as an instigator for meaningful behavioral change? This personal framework termed ‘enabling design’ has been explored through a series of practical design briefs, stretching back to 2009. This project investigates behavioral change in the field of minimal running footwear and implements practical methods such as design for disassembly and stewardship schemes.

Minimal running footwear is based on research by advocates such as Daniel Lieberman (2010). It is claimed that conventional padded footwear weakens the foot and keeps a runner dependent on expensive overly technically running footwear (Mcdougall, 2009). By ‘correcting’ the heel strike tendency in runners, and encouraging forefoot strike technique, it is believed that muscles will be dramatically strengthened and injuries reduced. On the back of these claims, minimal running footwear is an interesting case study for investigating behavioral change and enabling design.

A summer internship with New Zealand Footwear company ‘Tobe’ was the foundation for an exploration into minimal footwear. The internship inspired me to consider how my personal design philosophies and values interface with industry realities. My journey through this year can be divided into 4 key learning strands:

- **Design process:** The development of a minimal running footwear solution.
- **Project research:** Learning in the field of barefoot running and minimal footwear.
- **Enabling design:** Further developing this framework through a practical design project.
- **Industry learning:** Reflections on a summer internship with ‘Tobe,’ and my industry interactions throughout the project.

This is a highly visual thesis that draws four key reflections for each of the identified learning strands.
1.0 Methodology

2.0 Research Methods

3.0 Process Journal

4.0 Enabling design

Introduction

Project background and outline

1.0 Methodology

Planning methods

Discussion action research

Expert interviews

Literature review

Observations

20/20 study reference

Literature review

Observations

Product analysis

Character profiles

Reflective Journal

3.0 Process Journal

Initial design methods

Historic footwear

Footwear sketching

Observations

Working prototypes

Concept evaluation

Final prototypes

Final Industry feedback

Integrating the runner

4.0 Enabling design

Expert feedback

Company feedback

Eco system design

Concept validation

Final prototypes

Undergraduate project reflections

Sustainability and young designers

Strengthening the runner

Industry learning

Conclusion

Sustainability and young designers

Design process conclusion

Indirect industry feedback

Sustainable industry feedback

Key learning strands

Literature review

Critical Frameworks

Undergraduate project research

Enabling design

Student or design studio

Industry learning

Introduction and outline

Better by design CEO summit

Project Research

Enabling Design

Industry Learning
1.0 Methodology

1.1 Action research
1.2 Research methods
1.3 Design methods
1.4 Frameworks
1.5 Ethics
1. Action Research Methodology

Qualitative research is that which deals with elusive or subjective data, personal opinions or experiences. Action research is a qualitative methodology, which aims to close the deficit between research and practice (Collins, 2010 p10). It is particularly effective in understanding research in real-life situations. The researcher collects, reflects, and analyses the collected data in order to facilitate change (Gray, 2009).

Action research is a cyclic process whereby the researcher passes through four main phases of planning, action, observation and reflection (Groundwater-Smith, 2009). Although these cycles of investigation may continue indefinitely, it is vital that the researcher has a clear sense of purpose and direction as the exploration leads toward the goal of understanding and defining research outcome acts to focus the development of a minimal running shoe. This research phase will ultimately manifest in the action plan and feeling.

1.1. Gibbs Reflective Framework

**Description**
- What happened?
- What was good and bad?
- Feelings
- What sense can you make of the situation?
- What were you thinking and feeling?
- What was the impact on the research?

1.2. Key Research Methods

**Literature Review:**
This literature review is a summarising that embodies the theoretical component of the development of a minimal running shoe. This review aims to combine the insights and understanding gained from a previous collection of sources in a specific field, identifying any potential gaps, for further enquiry (Manalo & Trafford, 2004, p. 45).

A literature review has been used to explain and clarify the philosophy of barefoot running and its impact on the performance footwear market. The work of field experts Daniel Lieberman, Lars Saxby and Christopher McDougall, provided a critical perspective on the barefoot running phenomenon and its potential gaps for further enquiry. (Manalo & Trafford, 2004, p. 45). The researcher experiences the real-life constraints, opportunities and precedents available in the real or imagined context, (Collins, 2010 p.108). This text should include a critical analysis and summary of a number of sources in a specific field, identifying any potential gaps for further enquiry. (Manalo & Trafford, 2004, p. 45).

The work of field experts Daniel Lieberman, Lars Saxby and Christopher McDougall, provided an in-depth insight into the barefoot running philosophy. This research allowed the researcher to simulate or participate in the designer’s environment, allowing them to gain first hand experience of the minimal running concept. This practical design research tool requires 'Do-it-yourself' Reflective Journal. The researcher collects and reflects, and analyses the collected data in order to facilitate change (Gray, 2009).

**Expert Interviews:**
Interviews have been used to gain insight into the perspectives of experts who have studied the philosophy of barefoot running. Interviews were also undertaken with a second physiotherapist to attain multiple expert opinions within the practise of sports medicine. Interviews have been used to gain insight into the perspectives of experts who have studied the philosophy of barefoot running. Interviews were also undertaken with a second physiotherapist to attain multiple expert opinions within the practise of sports medicine. Interviews were used to gain insight into the perspectives of experts who have studied the philosophy of barefoot running. Interviews were also undertaken with a second physiotherapist to attain multiple expert opinions within the practise of sports medicine.

**Observations:**
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more specific product reviews. The following principles were used to prompt a reflection on key areas of the project’s design process, materials, branding, innovation, ergonomic considerations, and underlying sustainability frameworks.

Character Profiles:

While sketching and finalising the character profiles were constructed based on a literature review, field observations, and interviews with colleagues. This exercise helped me understand the potential users of a new footwear design. The fictional users provided focus and allowed me to build up the key areas of the shoe’s design: form, function, materials, branding, innovation, ergonomic considerations, and understanding sustainability frameworks.

Character Profiles:

1.4 Human Centred Design:

Undergraduate and Honours years, I have been interested in how a product might make accessible the proposed benefits of sustainable design for local manufacture and material sourcing has a direct relationship to how the designer deals with construction techniques and material. If a product is designed specifically to be easily disassembled and recycled, potential jobs could be generated by a closed-loop technosphere (McDonough, 2002). Shedroff (2009 p.183) identifies a number of techniques to help facilitate the design and implementation of a life cycle analysis.

Design for Disassembly:

This principle deals with the material and value of a product at the end of its life (Sodhi, 1998). Product disassembly deals with man-made materials. These techniques are considered to be part of the world’s sustainable development framework. By using more sustainable techniques to help facilitate the design and implementation of a life cycle analysis, more jobs could be generated by a closed-loop technosphere. This principle deals with the material and value of a product at the end of its life (Sodhi, 1998). Product disassembly deals with man-made materials. These techniques are considered to be part of the world’s sustainable development framework. By using more sustainable techniques to help facilitate the design and implementation of a life cycle analysis, more jobs could be generated by a closed-loop technosphere.
-Fasteners: Using non-adhesive fasteners, or reduce the need for fasteners altogether allowing for easy disassembly.

-Standardised components: Using parts that can be easily replaced or repaired to maintain a functioning and high quality product.

-Pure parts: Where possible, mono-material parts should be used in order to maximise the potential for successful recycling. (Shedroff, 2009)

Design for re-use: “In order to be truly sustainable, solutions need to both last longer and have a life after their normal use period” (Shedroff, 2009 p.176). In our society of over-consumption and disposability, products have lost their material value (Papanek, 1984), and deliberately designed reuse is very rare. There was difficulty in applying this principle to footwear design, however, applications such as packaging and branding tags, were potential opportunities to embrace the mandate for material re-use.

Minimalism: Minimalism is a suitable framework to consider in light of the barefoot, minimal running movement. This design brief had the goal of executing a beautiful and functional minimal running solution. Minimalism as a design principle is rooted in ‘an awareness of the fundamental, the building blocks of design’ (Walker, 2009 p.9). There is a certain mystery to minimalist notion that ‘Less is more’, where there are no set criteria for achieving a minimal design outcome. But it is unmistakably clear from the work of industrial designers such as Dieter Rams (Klemp, 2009) and Naoto Fukasawa (Fukasawa, 2007) that minimalism produces objects with an honest and attractive presence.

Minimal design transcends the notion of trend or fashion. The ten design principles of Dieter Rams emphasise the reduction of all non-essential features, focusing on what is truly important about an object. (Rams, 2009). ‘Unlike fashionable design, a product lasts many years – even in today’s throwaway society’ (Vitsoe, n.d). There is quality in simplicity. In the opinion of Japanese design company MUJI, true quality is found when a product’s simplicity lends itself to a variety of uses and environments (Hara, 2007 p.272).

Minimalism places specific emphasis on pure form and well executed details. This framework inspired the following intentions for the design of a minimal running shoe:

- The celebration of inherent material qualities before adding complexity.
- A focus on the profile silhouette of the shoe with special focus on the interface between the sole and the upper materials.
- Careful consideration of seams of the upper construction and its relationship to the geometry of upper.
- Restraint in branding the product, allowing the form and details to create personality and identity.

Ethics: Ethical approval would be a requirement in order to test and validate the design with real users. This project has used personal reflection and expert interviews as a method of concept validation. Also, the cyclic, ‘reflect and respond’ nature of the action research methodology saw many of my research and design methods evolve with the project.

1.5
2.0

2.1 Literature review
2.2 Expert interviews
2.3 Reflective journal
2.4 Observations
2.5 Existing product review
2.6 Character profiles
For the sake of clarity, my research methods have been grouped together in one chapter. In practice however, these methods have built on each other and have been woven into the cyclic design development process.
Early humans were without footwear for generations.

**Timeline:**

- **8000 BC** The first recorded woven sandal
- **1900** First rubber soled shoe
- **2005** Nike waffle trainer
- **2005** Vibram five fingers
- **2005** Nike free trainer

**Strike force:**

- **Heel strike vs forefoot strike technique**
- Heel striking produces initial impact force 3x the runner’s bodyweight.
- Forefoot striking produces initial impact force 0x the runner’s bodyweight.

**Joint stats:**

- **36%** Knee flexion torque
- **38%** Knee Varus torque
- **54%** Hip flexion torque

Achilles tendon blow outs have increased 10% since the rise of modern running shoes.

Studies claim that modern running footwear produces significant increases in joint torque:

- Heel striking produces initial impact force 3x the runners bodyweight.
- Forefoot striking produces initial impact force 0x the runner’s bodyweight.

*(XrayTechnicianSchools, n.d.)*
Barefoot running is a controversial subject that has been the focus of much debate. The study concludes with the suggestion that modern running shoes are weakening foot muscles and decreasing proprioception. This is supported by the findings of engineers and biomechanists who have studied the biomechanics of running. The study states that the superior mechanism of forefoot/midfoot strike technique is superior to shod running for the following reasons:

- Muscles, tendons and ligaments in the foot become stronger by practicing a more natural gait pattern.
- The body’s proprioceptive system is improved by the increased feedback from sensory receptors in the foot.
- The foot is able to perform a range of complex movements, including sprinting motion that occurs on the ball of the foot.
- The foot is able to absorb shock through the arch as it was designed to.
- Muscles, tendons and ligaments in the foot are strengthened by landing gently on the forefoot.
- The body’s proprioceptive system is improved by the increased feedback from sensory receptors in the foot.
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products. Manufacturers believe that the benefits made popular by other successful footwear

The barefoot running philosophy has also been

Footwear:

(Jarosky, 2011).

of barefoot running to the western world

had a significant impact on the communication

other influential barefoot runners) and has also

barefoot running shoe (worn by McDougall and

training for an ultra marathon through the

Mexican Copper canyons (McDougall, 2009).

the pursuit of his own distance running goals,

free from crime, high cholesterol, heart disease,

benefits in the practise of barefoot running, but

claims that not only are there biomechanical

and existence of this Mexican tribe. McDougall

times, distance running is core to the lifestyle

as it was central to human existence in ancient

incorrect (McDougall, 2009). He believes that

technique and the lifestyle of this remote Indian

secrets behind the world's greatest long distance

the Tarahumara Indians of Mexico and learn the

Sandler, stresses that patience and small steps

A Colorado-based running coach, Micheal

runners adopting the practice barefoot running.

A number of articles addressed the issue of shod

Newspaper review:

(Work Out and Bare Your Soles, 2012). The

opinion of the main finding of the research and

discusses the concept of minimal footwear and

strained and phones to limits. This can be

reduction in the body's joints than wearing a pair of high

heels. Due to a highly elevated heel, traditional

the average running shoe does more damage

Current, there is no decisive evidence to

questions much of what we have come to accept

business philosophy, bringing into question much of what we have come to accept as 'necessary' to the practice of running. The persuasive argument of barefoot advocates, scientists and biomathematicians have caused significant shifts in modern running theory and practice, forcing the footwear industry to take notice of their ideas. This reality can be seen through the responses of international companies such as Nike and Newbalance who have built entire product ranges around barefoot philosophy. It seems that regardless of the sceptics, barefoot running has made a lasting impression on modern running culture; and has provided an exciting opportunity for designers and engineers to redefine the boundaries of performance running footwear.

Bare Your Soles, 2012).

Born to run. It is clear from the diverse range of articles

(Chirs McDougall, 2009). Barefoot is a natural extension of the

born to run. (Chirs McDougall, 2009). The book sparked an international phenomenon,

as 'ToBe:', to release minimal running solutions

as part of the performance footwear market.

Muscles atrophy as they

support for negate the claims of the

either support or negate the claims of the

Currently, there is no decisive evidence to

the barefoot running craze to date (Nigg, 2010).

Critics claim that the barefoot running craze has produced a large number of serious injuries. This has not been able to prevent

attribute these injuries to the overly zealous who

to those keen to lace up the latest trends (Work Out and

other running injuries and the overuse and

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reflected in the current shift toward barefoot

and minimal footwear (Macdonald, 2012) are an example of how manufacturers

to accommodate both customers

and has provided an exciting opportunity for
designers and engineers to redefine the boundaries of performance running footwear.

Bare Your Soles, 2012).

critics around barefoot running have

in running culture and its products. His firm

the mainstream, instigating widespread shifts

the ideals of a small running community to

of 'Born to Run' in 2009 (Kenworthy, 2009).

has inspired much of this craze by the release

of organics and connecting with nature is

suggests that the increasingly popular culture

exempt from its ties to fashion and market

world-wide director for running shoe design at

New Zealander Andreas Harlow, worked as the

movements in decades past (Nigg, 2010 p195).

industrial designer and has been an important author and speaker on running

Step by Step

in the popular running shoe market.

stimulating a variety of organic and minimalist thinking in running footwear and its products. His firm

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a modern running shoe with a minimal foot from the

The book sparked an international phenomenon, spreading the barefoot craze to the mainstream public. Chronicled as a modern running shoe best seller, appealing to disfranchised shod runners in the search of the most barefoot running shoe (worn by McDougall and other influential barefoot runners) and has also had a significant impact on the communication of barefoot running to the western world (Jarosky, 2010).

Footwear:

the barefoot running philosophy as it may be marketed.

McDougall, 2009).

to release minimal running solutions into the performance footwear market.

common practise for manufacturers to release

minimal solutions with degrees of support

and cushioning, allowing the user to moderate their

journey towards super minimal footwear. This

industry has been inspired designed by sporting

companies such as Nike, Adidas and Asics, but has also

provided an opportunity for small footwear companies such as Baja Steps to Barefoot Running. 2011). Ultimately,

not about speed, but a smooth, even running technique that focuses

on the foot muscles and impact on the joints in running.

The Barefoot Running Philosophy has also been marketed as a modern running shoe with a minimal foot from the

of the barefoot movement and the effects of the

McDougall, 2009).

Bare Your Soles, 2012). The barefoot running craze

incurred more than running without footwear (Laurance, 2003). Transitioning away from such products

requires a shift in thought, as it is essential to

must adjust both their footwear and technique

simultaneously.

Copyright © 2012. All rights reserved. "Bare Your Soles" must be used only by the author of this piece by the release of "Born to Run" in 2009 (Stewart, 2009). The book has been powerful in communicating a simple message about the benefits of running barefoot (or in minimalist footwear, i.e., shoes that provide no support). It also demonstrates that running barefoot enhances performance in a variety of activities, including endurance running, improving running economy, and reducing injuries. It is clear from the diverse range of articles

and has provided an exciting opportunity for designers and engineers to redefine the boundaries of performance running footwear. 

2009).

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Expert Interview

2.2

Two key experts were interviewed in order to attain an accurate understanding of the current research and opportunities offered by the barefoot running movement. The following statements summarise the discussions with these experts:

Kelly Sheerin
AUS Millennium Institute Running and<br>Create and Innovate Clinical Manager.

Key Findings:

Research into barefoot running science is currently fueling the craze of minimal running footwear. Market trends often occur very quickly.

In the same way that Nike fees are interpreted for uses other than those they were designed for, there is the potential to explore the functional flexibility of minimal running footwear.

Daniel Lieberman and his evolutionary approach to arguing the barefoot running movement has received a lot of criticism from established biomechanists. Not everyone agrees with his forthcoming research claims and findings. Irene Davis, of the University of Delaware provides a much more level headed approach to this field, and has a significant level of credibility amongst biomechanists.

Lesser known companies have been able to capitalise on the popularity of barefoot running. Every major shoe company has begun to explore the minimalist footwear movement. The undefined and slightly hectic state of the current running footwear market is a perfect opportunity to propose new design solutions, and ask questions of what might be useful as minimal running footwear.

A company such as 3M, might also fuel exploration into different types of lock mechanisms and provide tangible solutions for the footwear application.

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much success with minimal running footwear. But the barefoot running movement has essentially created a lever at the ankle joint. With all running shoes, there must be significant consideration given to how long they are designed to last, and how the wear of the shoe is communicated to the user. With durable, long lasting materials, there is a danger of the upper remaining intact, while the sole rubber parting, or over compresses without the user being aware of the damage.

Barefoot running is far from an exact science; new research is constantly surfacing, and no simple diagram can be drawn to summarise the pros and cons of a particular running style. A simple diagram can be drawn to summarise the arch of the foot, ultimately, shock absorption is communicated to the user.

While initial shock waves are absorbed through the arch of the foot, ultimately, shock absorption occurs throughout the whole body.

Daniel Lieberman and his evolutionary approach to arguing the barefoot running movement has received a lot of criticism from established biomechanists. Not everyone agrees with his forthcoming research claims and findings. Irene Davis, of the University of Delaware provides a much more level headed approach to this field, and has a significant level of credibility amongst biomechanists.

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Physiotherapist
MNZSP BHSC (PHYSIO)

Key findings:
Heel striking is the most common technique in running and is usually seen in amateur/recreational runners. Whilst maybe not the ‘ideal’ technique, most people do not have too many issues with conventional footwear.

Barefoot running philosophy does not negate the decades of footwear engineering and podiatry research. This research is still very necessary for the main percentage of runners who do heel strike. They need this dampening force on the heel as changing running technique is too difficult for most amateur runners to attain.

In its extreme form, barefoot running is claimed to be a lifestyle and much more than good technique. We live far too sedentary a life to return to ‘running as it was in ages gone by.’ We are no longer walking and running constantly in daily life and most commonly, physical activity occurs on the weekends. Also, man made running surfaces are very different to sand, grass etc.

Currently, barefoot running seems solely a fashion movement in the footwear industry. However, in the same way that ‘free range eggs’ or ‘organic’ food brought changes to industry - consumer driven movements are able force big industries to accept new philosophies and provide their own variant of a ‘fashion’ trend. This can be seen in the Nike Free range of shoes, developed so as not to miss out on the market share.

The key characteristics of a minimal running shoe are as follows: Lightweight, minimal support, flexibility.

The main injuries attributed to the activity of minimal running can be broken into a few key areas:

- Foot injuries - 5th MT stress #, 5th MT-TJ strain
- Ankle injuries - tibialis posterior tendonitis, ankle injuries - Patella-femoral joint pain (most common)
- Thigh - ITB overuse tightness

Moving towards barefoot running should be a gradual transition - 6-18 months worth of transition phase: including Hip, knee and ankle strengthening and stability exercises and focus on mid/forefoot running rather than heel striking.

Sound technique is very important - unfortunately not many of us have it; nor do we or have the time or the passion to attain such technique. Therefore, correct shoes to aid with your technique is very important. The type of shoe currently in use is one of the first questions asked to any new patient with a running related issue.

There is a significant reduction in all supporting material in a minimal running shoe, especially around the heel and ankle. This has an impact of the frequency of ankle injuries such as tibialis posterior tendon overload. But there is probably more impact on knee injuries than anywhere else.

Potential benefits of a running shoe that embodied the minimalism of barefoot running whilst providing a form of lightweight support are as follows:

- Faster for race day performance - i.e. like track shoes
- Encourage intrinsic (internal) muscle strength
- Encourage Hip, knees and ankle strength and control
- Cheaper to make and hence cheaper cost

Possible less reduction in injuries than complete minimalist running shoes.

Possible use as a bridge for athletes wanting to progress to barefoot running over a few years.
Observations

Early observations took place through viewing barefoot running blogs and video footage. This method established a clear understanding of barefoot running locomotion. A second, more fluid stage of observations took place through expert and user feedback. As the prototyping phase developed, concepts were tested and observed to gather functionality and usability insights.

1. An online clip comparing heel striking with barefoot technique (Fitness footwear, 2010).
2. Observing an expert testing a modular sole prototype.
3. Observation photography from a user testing the strapping harness prototype.

Video journal

A nine minute video journal summary can be found on the CD supplied with this Thesis.
By graphing a number of minimal running shoe designs on a set of axes, a market gap was more easily identified. In this case, I have used the headings ‘lightweight’ and ‘super minimal’ along the horizontal, to cover a broad range of barefoot running solutions. The headings ‘supportive’ and ‘no support’ allowed me to organise these solutions across the vertical axis to reveal a market gap. This exercise helped to inspire an exploration into the notion of minimalism and its relationship to lower leg support.

Shoe Retailers:

Visiting local running shoe clinics was helpful to my understanding of this market. Each visit consisted of a conversation with the shop assistant on his views of the barefoot running movement, as well as their thoughts on my area of research. Shop assistants explained the features of different products, as well as their opinion on how to begin wearing minimal running footwear.

Existing Product Analysis

2.5

Character Profiles

2.6

Age: 30
Fitness level: Moderate to high
Minimal running experience: New to minimal running footwear, this persona runs a 7km route from his apartment four nights a week after work. He has worn a prescribed pair of Adidas Supernova running trainers (2) from Shoe Science for five years. He replaces the shoes every 200km due to compressed EVA foam, and worn tread pattern.

The thick soles of his current footwear leaves him feeling unstable in running gait, and he wears support braces on his weak ankles. He has read a lot about the benefits of the barefoot running movement, and has decided to begin the process of graduating to minimal footwear. He is yet to find a footwear solution that both allows a gradual introduction to barefoot running, while providing a form of lightweight support for his weak ankles.

She is often frustrated by how quickly her tread wears down across the forefoot of her shoes, while other areas remain in good condition. She feels guilty when she throws out these shoes, and wishes there was a way they might be resoled. With regard to cleaning, she has recently damaged a pair of expensive running shoes by machine washing, and wonders why shoes are so difficult to clean.

She has also begun to consider how to adjust to more radical minimal footwear solutions, but is unsure how often she will have to replace her shoes.
3.0
Supervision cycles: Twelve supervision meetings provided structure to the action research methodology. At each meeting, research and practical work was presented and discussed. The recorded notes from these meetings, where translated into a project plan. Acting on this plan, new research and practical work was collected to present at the next supervision meeting. Reflecting on the feedback and discussion points informed the planning stages of the subsequent cycle.
3.2 Insights: The following categories synthesise research into a set of key insights.

**An interesting market gap exists that explores the tension between minimalism and support in footwear.**

A runner should have control over their graduation to minimal footwear. Too much, too soon is dangerous.

Design cues on the sole could be used to help runners gauge where they are landing.

One footwear solution could be designed to cater to different needs in minimal footwear users.

Minimal running footwear has clear tie-ins to historic sandal-like structures.

Minimal footwear should embrace simple sole construction techniques and use less materials. Nasty adhesives should be designed out of a shoe where possible.

Lacing is a very traditional method of securing footwear. There is real opportunity to develop innovative securing systems for minimal footwear.

**The shock associated with heel striking is claimed to be very damaging to a runner's body. Minimal footwear eliminates the shock absorbing heel, fostering sound forefoot strike pattern.**

Running footwear is much less scientific than what is marketed to the user. The barefoot running movement has opened the doors for new interpretations of running footwear.

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Conventional running footwear has overcomplicated the practice of running.

While interrogating the role of lightweight support in minimal footwear, two characteristics of minimal footwear should be honoured:

1. Zero drop: no rise in the sole from heel to toe.
2. Wide toe box: the foot should be free to move for maximum sensory feedback.

There is a significant reduction in all supporting material in a minimal running shoe, especially around the heel and ankle; this has an impact on the frequency of ankle injuries.

**Minimal footwear could be used to foster more resilient runners, who do not depend on excessive technologies in order to run.**

Modular parts could act as a catalyst for a long term, sustainable, business-user relationship.

The minimal running movement has identified that running is a skill that all people should possess.

In order to tell the story of this product effectively, considerations such as branding and packaging should be carefully thought out.

The design project should propose radical, playful solutions for minimal running footwear. However, there is a tension here between radical thinking and usability.

Pure barefoot running involves no footwear interventions. With this in mind, what is the role of design in this field?

While running footwear is important for the majority of modern runners, correct technique is the core mantra of the barefoot running movement.

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Introduction:
This design project will be based around three key areas of performance footwear:

i. Unpacking the footwear design opportunities afforded by the barefoot running philosophy.
ii. Exploring the relationship between minimalism and support in running footwear.
iii. Exploring how the ‘Tobe:” ‘fitwool’ could be integrated effectively into running footwear.

Running shoes have evolved to become thick soled and shock absorbent over the last 40 years. The recent publicity of the barefoot movement has forced the running shoe market to explore the claims of the philosophy and develop products accordingly. This market shift has opened the door to new design solutions that challenge how we define performance footwear.

ii. The balance between support and minimalism is a significant area for exploration in the barefoot shoe market. There is the potential to challenge how a form of lightweight support may be present in a design solution whilst staying true to both a minimalist aesthetic and function.

iii. A material exploration of the ‘Tobe:’ wool fibre is an opportunity to further unpack and challenge the definition of modern running footwear. The natural and honest aesthetic of the ‘Tobe:’ ‘fitwool’, provides an exciting medium for capturing new forms and structures in the upper construction of a running shoe.

Key Objectives:
- Design a super minimal running solution with specific consideration given to a lightweight upper form, a simple support system and a minimal, replaceable sole.
- Design how the product acts to establish a sustainable customer business relationship through the development of modular, replaceable parts.
- Demonstrate the relationship between lightweight, close-fit support and minimalist footwear construction.
- Use design to interpret historic footwear inspiration in a contemporary and innovative fashion.
- Primarily, the design should work effectively as a running shoe, but also have the capacity to function as casual attire.

Constraints:
- The design must not include features that are impossible to manufacture. Within the overarching context of the research project, business and manufacturing realities should be well considered.
- Materials used in the design must be readily available for prototyping and testing, to attain a true understanding of the product and its function.
- The design should be fashionable and effective as both male and female footwear.

Target user:
This design project is aimed at both established, minimally shod runners and those intrigued by the current publicity of the barefoot running movement. The relationship between support and minimalism embodied in the shoe design will attract those interested in barefoot running but may feel uncomfortable in typical, unsupportive minimal footwear. Potentially, those suffering with unstable joints from ankle sprains and Achilles tendon issues may find minimal running accessible through this design intervention.

Ultimately the design will be aimed at those who are between the age of 20-40, have an interest in minimal running and a healthy lifestyle. Although the product will be suitable for performance application, the target user will not be focussed on professional competition.

Market:
The running shoe market has been forced to respond to the recent rise of the barefoot running movement and its views on minimal footwear. This market shift has provided an opportunity for reinterpreting performance footwear, challenging the exclusive and technical practises surrounding this field. The simple and empowering claims of the barefoot philosophy should inspire new ideas, previously unsuitable for running shoe applications.

The design will also target a market that overlaps casual and sporting footwear.
cycle one
February 22 - March 5

formulating a design brief
sketching in response to insights
practisetheory
reflections
research...

Footwear design concept
[overarching theme of enabling design]

research insights
personal design ethics
response to design brief
sole design
strapping
harness
clips/fasteners
sleeve design
prototyping:
self reflection
product testing
expert opinion
concept validation

[ideation process]

literature review
sustainable business inspiration
personal reflection
prototyping concept development
radical thinking
story telling
minimal footwear concept

packaging
product
branding
contemporary design

2011
Facilitating an ideation session with Masters and Honours students.

A group brainstorming session generated a large number of creative ideas around: a) The concept of a sole, b) The concept of a strapping system.

The initial brainstorming phase provided a foundation for a more systematic lotus blossom exercise. Ideas were grouped into sub headings such as usability, aesthetics, and comfort. This allowed for a more structured approach to the ideation process.

The lotus blossom exercise proved to be effective in mapping out the creative potential of individual concepts.
Running through the city streets. A photographic study of the urban pavement and inspiration for a graphic sole language.
Conventional running shoes are built on a ‘last’; a plastic form that dictates the shape of the finished shoe. Because the foot is very malleable, it is important that the true shape of the human foot is referenced in minimal shoe construction: The toe box should provide room for the forefoot to move without restriction. Often, traditional shoe lasts force the forefoot into cramped and unnatural positions, directly affecting the shape of the human foot.

Expert interviews, observations, reflections and photographic analysis lead to a number key insights into self-reliance and communication. A design brief was formed around the need for powerless communication in Christchurch; but the project was also a canvas for deeper reflections. In particular, I continued to develop a personal design framework centered on design for empowerment rather than simply convenience. I began to question how design might be used to ‘enable’ product users; teaching skills and fostering knowledge for sustainable living.

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research phase impractical. There is pressure for all tasks to be conducted efficiently and productively. “Design thinking is a human-centered approach to innovation that draws from the designer’s toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success” (Brown, 2012). Taking on research responsibilities in the internship has sparked a new understanding of the value of quick fire design thinking techniques. The IDEO (2010) method cards provide a high volume of hands-on exercises for quickly generating insights. These insights can be further distilled and refined to form design objectives for a project. Although these exercises may seem trivial and simplistic in an academic context, the industry time constraints transform these methods into highly valuable research tools. Tim Brown (2012) recently spoke at the Better by Design CEO Summit about the value of converting the researcher’s empathy (realised through design research) into design insight. These insights inform new design possibilities to then be prototyped, tested and refined into useful and meaningful product solutions. Although Brown is quick to point out the danger of oversimplifying complex problems using the design thinking philosophy, there is much value in using this approach as a foundational problem solving tool.

During the internship, I was allocated the task of researching and generating ideas for the packaging brief. Acting out the retail experience of trying on a pair of shoes, coupled with a still photo survey, was a useful tool for gathering insights. Rapid ethnography in a number of leading sport shoe retailers allowed me to attain a deeper understanding of the shop assistant and their relationship with the packaging. These industry encounters with quick fire research lead me to reflect on my approach to honours design research. The internship has exposed me to the value of efficient decision making for the cause of project momentum. Without the time and pressure constraints of the industry environment, students often over-analyse decisions that should be made quickly. Feedback from my examiner regarding my hesitant transition from research to practical work supports this goal of efficient decision making.

Methods of design:
In the absence of an immediate ‘design problem’, the challenge of exploring and developing a unique minimal running shoe offers a new set of design experiences to learn from. Apple’s Jonathan Ive (2012) recently responded to a question on ‘problem solving’ in design: “There are different approaches - sometimes things can irritate you so you become aware of a problem, which is a very pragmatic approach and the least challenging. What is more difficult is when you are intrigued by an opportunity. That, I think, really exercises the skills of a designer. It’s not a problem you’re aware of, nobody has articulated a need. But you start asking questions, what if we do this, combine it with that, would that be useful? This creates opportunities that could replace entire categories of device, rather than tactically responding to an individual problem. That’s the real challenge, and that’s what is exciting!”

2011 honours enquiry played out a problem focused, pragmatic approach to product design and the approaches could be discovered in the minimal running shoe market.
cycle two
March 5 - March 19

Formulating a design brief
Sketching in response to insights
Practise the theory
Reflections
Research

Footwear design concept
[Overarching theme of enabling design]

Research insights
Personal design ethics
Response to design brief
Sole design
Strapping
Harness clips/fasteners
Sleeve design

Prototyping:
Self reflection
Product testing
Expert opinion
Concept validation

Design brief
[Project]

Customer company
Packaging
Product

Enabling design research
Barefoot running research
Industry learning

Foundational design methods
Literature review
Sustainable business inspiration
Personal reflection

Prototyping
Concept development
Radical thinking
Story telling
Minimal footwear concept

2011
Packaging
Product

Contemporary design
formulating a design brief
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foundational design methods
[ideation process]
literature review
sustainable business
inspiration
personal reflection
prototyping
concept development
radical thinking
storytelling
minimal footwear concept

2011
packaging
product branding
contemporary design

cycle three
march 19 - april 23
The sole needs to accommodate for a spacious toe box, allowing the forefoot to move without restriction. While fulfilling this requirement, I must be careful to balance the proportions of the forefoot with the heel and midfoot shaping.
Inspiration: How might the simple ‘sole, strap’ language represented in these images translate into running shoe design? Is it possible to move away from sandal connotations while working with such traditional elements?

Quick prototyping: A perforated wooden sheet, found in the design studio, was left over from a colleague’s design project. The sheet sparked the development of a modular sole form.  

1. (Pratt, February, 2012)  
2. (Winney, n.d.)  
3. (Kawasaki, 3rd March, 2004)  
4. (Acabado Imperfecto, July, 2012)
The prototyping phase: An exercise for guiding the prototyping process was trialed early in the prototyping phase. This method used a matrix (Diegel, 2010) for measuring components of the design against set criteria (see appendix 1).

Innovation is found in the tension (Hobcraft, 2011). Designers should develop a tolerance for ambiguity (Katelle, 2011), understanding that often the most innovative and creative ideas are discovered through investigating contradictions (Apple, 2012).

This project explores how a running solution might embrace minimalism yet incorporate lightweight support for the foot and ankle. Using this tension as a driver for innovation, I sought to develop a creative footwear solution that would: a) function effectively for the minimal running application; b) propose a unique interpretation of minimal footwear.

concept direction

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Sustainable Relationships:

Spangenberg (2010) believes we can transcend eco design, or design for the environment by offering [people] opportunities to get involved, [and] express [their] own identity beyond consuming standardised mass products.

In what ways could footwear design be used to establish a lasting customer business relationship? Perhaps recyclable, replacable, repairable parts could be used to empower the customer to ‘maintain’ the product.

Foot and Ankle injuries:

Podiatrists claim that barefoot running has taken producing an increasing amount of foot and ankle injuries. Such injuries occur due to poor technique and patients who jump into minimal running too quickly (Kuzel, n.d.). One researcher claims that in barefoot running technique, the ground reaction force torque the foot around the ankles, increasing the risk of injury (Anderson 2010). As was concluded through my literature review and expert interviews, this area is not an exact science. How might a shoe design ease the transition to relatively minimal footwear?
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Running reflection: The experiential learning component of this project was essential to the development of a minimal running shoe design. New ideas often occurred to me during my runs, leading to spontaneous prototyping sessions when I returned home. This exercise is an example of a research method that developed from the action research cycles.

Business Model Inspiration: German Bag company Freitag, has established a inspiring mix of creativity, environmental/social responsibility and economic success over the last two decades. Truck tarpaulins, inner tubes and seat belts are upcycled to create highly functional and fashionable bags, wallets and purses for a range of users. Freitag has built a local, sustainable business with a focus on steady growth (DeFranza, 2011) and has been successful in closing the gap between the end user and manufacture.

This company exemplifies Spangenberg’s (2010) mandate for empowering design, that enables customers to participate in their own unique story of material reuse. Bag design is used as a medium to foster resourcefulness amongst customers; encouraging people to buy into where their product has come from and how it was made.
Sole form:
Running in this prototype has created some interesting depressions across the surface of the sole. The forefoot has held the most significant impressions from wear, while a subtle curvature can be seen across the heel. These cues may be useful for informing the shape and textures of the sole design.
Strap weaving:
Conceptually, perhaps the securing straps could ‘grow’ from an upper form. The weaving inspiration would integrate the strap function into the core of the object’s ‘woven’ aesthetic. Alternatively, plotting a simple functional strapping path across the upper may best communicate the overarching concept of lightweight, close-fit support.

Sole design:
How might a sole design be developed around the pavement studs photographed on a recent city run? What can be learned from existing performance shoe soles?
The replaceable insole/outsole:
Based on two key insights:

1) Main areas of wear: Compressed EVA insoles, tread pattern deterioration.

2) Minimal running promotes forefoot strike pattern. Tread pattern wear indicates where the foot is striking the ground most often.

Therefore, those running according to barefoot technique, should wear more significantly across the front of the sole. A replaceable midsole that pressure fits through the outsole, allows the runner to monitor their technique while extending the life of the overall shoe.

CAD Mould: The most significant barrier in the development of a minimal running solution, was the execution of an accurate working model for testing. A sole concept was translated into CAD from a wooden workshop prototype. A mould taken of the part in solidworks would be printed in the rapid prototyping machine, ready for casting.
Expert feedback:
Feedback from field experts and business partners was a vital component of this project. A progress summary was presented to the following individuals for review:

Kelly Sheerin: AUT Running Clinic Manager
Physiotherapist: MNZSP BHSC (PHYSIO)
Tim Brown: "Tobe"

The experience and knowledge of field experts helped to support new ideas and provides invaluable rigor to the development process. In addition to presenting 2D conceptual work, there was a need to resolve functioning, well-executed models to discuss with experts.

The following response is an example of the feedback received from 'Tobe':

"I have been thinking a lot on your "process" document and have been really inspired by it. I think it aligns closely with some of my thinking around strapping and how you might replicate the shoe form with strapping. I also very much liked the idea of rubber dots that you could apply to, say, a Fitwool sock upper and provide grip and wear without becoming a full sole. I think a lot of the parameters for that sort of experimentation will come when we see what this fabric can and can’t do.

From your document and a lot of my thinking I think there are real opportunities to explore this from the back to front. How can you innovate the making of the shoes? Where do the opportunities lie at the back end of the process?" (T. Brown, personal communication, July 3, 2012)
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may 7 - may 21

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Inspiration:
This stage of the project has uncovered the value of embracing the more playful nature of the enquiry.

The Japanese Bear shoe has very similar geometric forms to the direction of my design, and also uses a similar fastening and support system around the ankle. The use of bear fur in the upper also has an interesting tie into the wool fibre used in current prototyping. These thoughts inspired me to consider developing the world this product lives in and its underlying story.

Japanese Bear Fur Shoes

Testing and validation:
One of the most significant insights to come out of the early research and expert interviews, was the opportunity to playfully explore new footwear solutions.

Due to the radical approach of this design brief, it was decided that user testing would occur through my own running reflection (see video journal). The aim of my design process, was to develop a strong story around a footwear solution, that could be further refined and tested outside the scope of this project. Regular feedback from experts, designers and business partners at ‘Tobe’, acted to validate and refine the core ideas of the concept.
Revised prototyping plan:
As the concept developed, six key areas of the design were identified to focus prototyping efforts.

1. Tensioning clip
2. Strapping harness
3. Minimal running sleeve
4. Stitch pattern
5. Minimal running sole
6. Durable outsole

Concept Description and Critique:

The benefits of this concept are as follows:

A removable, minimal sleeve allows for easy machine washing. The runner is able to gauge their wear pattern across the forefoot tread, monitoring strike pattern. The minimal sleeve could easily be replaced once the tread has worn down, without replacing the durable outsole. This aspect of the design uses forefoot wear as a way of teaching the user about correct striking technique.

The strapping harness (connected to the durable outsole) provides the runner with a form of close fit, lightweight support, whilst eliminating the need for lacing. The strapping harness acts to hold the shoe together while running. This construction technique eliminates the need for harmful glues and adhesives in the manufacturing process.

This interpretation of the design would allow a user to graduate towards minimal running, monitoring the level of support present in their footwear. The goal of this design would be for runners to become more comfortable with super minimal footwear - bridging the gap from running shoes to running socks. This concept has close parallels to the 4th semester Tri-Cast project, embracing a strong element of story telling in both the products form and function.

Currently, the potential issues with this concept include:

- Resolving a tread pattern that punctures through the outsole in a secure fashion.
- Weather proofing and the issue of seepage through the holes in the sole.
- The tread pattern wearing out and no longer fixing to the durable outsole properly.
- Tripping over in running motion, and having the outsole rip away from the rest of the shoe unexpectedly.

The design behaves as a tool to graduate runners towards minimal running footwear.
Stitching patterns: In a simple sock-like upper construction, stitch patterns heavily influence both the shape and aesthetics of the design. I had access to a high performance domestic sewing machine, allowing for a creative exploration of complex and professional stitch patterns.

Midsole tread pattern: A key part of this design direction relies on a durable, but modular sole for the running shoe. The tread studs placed across the sole of the minimal sleeve must be both robust and secure when they puncture through the outsole. In addition, they must also have the capacity to disassemble with the use of moderate force.

The following diagram describes the key considerations for prototyping this modular sole, focusing on the size and flexibility of the studs (a). Similar attention must be given to the material properties of the outsole construction (b).
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cycle six
May 21 - June 5

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Packaging concepts: The packaging of a concept plays an important role in a product's story telling, but may also impact the object design development. The following packaging research and sketching documents my early thinking around potential shoe box forms and its integration of a washing bag.

In-Store Research:
- Instead of lengthy information tags, Nike frees utilises the inside surfaces of the shoe box to tell the story of their product.
- In discussing the innovative puma packaging with a shop assistant, he found dealing with this system to be annoying. The packaging was untidy from where it had been opened and not reassembled properly.

Simple packaging concepts were developed that would function effectively for customer, retailer and product transport.
These two logos represent the casual and running labels of the existing brand. Perhaps the '+' and 'O' graphic treatment could speak of the tension between a running shoe and casual footwear.

Cross imagery reflected in the harness and stitching.

Circle imagery reflected in the sole and neoprene texture.
Footwear design concept [overarching theme of enabling design]

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cycle seven

june 5 - june 30
Modelling and progress:
In an unfamiliar medium such as footwear, much of my time was dedicated to developing clean, functioning prototypes. Although concepts may seem feasible on paper, or even through the lens of CAD software, physical prototypes are the only really method of testing and validating ideas.
Design approach: Earlier in this thesis, I discussed my aim to explore an area where nobody had specifically articulated a need. How might I develop a meaningful and useful product without a direct problem to solve? Using the tension between minimalism and support as a driver for innovation, unique product ideas began to develop.

To reflect once more on Apple’s (2012) design ethos: The success of the latest Macbook was a result of rigorously interrogating the market norm. The computer explores the tension between extreme performance and portability (Apple, 2012). In a similar way, I aimed to investigate a potential contradiction in the minimal running market, in order to drive the development of a new performance footwear product.
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June 30 - July 30
Simple construction
The following key discussion point arose from a discussion with ‘Tobe.’
Wages in China are forecast to rise from $.50 US an hour today to $4.50 an hour in 2015; how can the design of a shoe allow for simple and local manufacture?

Although manufacture is not the goal of this conceptual exploration, my design work utilises simple construction techniques to maximise the potential for local manufacture.
Resin casting experiments:
After using CAD to produce a feasible, two-part female mould, a number of wet lab experiments took place.

The key areas of testing were as follows:
- Identifying a successful release agent
- Finding a suitable resin and shore hardness rating for a durable shoe sole application
- Experimenting with the reground tyre granules in the shoe sole. (In keeping with the identified sustainable design framework, recycled materials should be used where possible in manufactured parts)

1. First cast with silicone rubber:
2. Silicone rubber too flexible
3. Recycled tyre granules:
4. Testing release agents/resins:
5. Latex as a release agent:
6. Latex release agent successful:
7. Recycled tyre sole successful:
8. Testing modular concept:
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Cycle nine
August 14 - August 27
Feedback:
Project feedback can be broken into four areas; field experts, company input, users, and supervisors.

Field Expert:
Kelly Sheerin:

My second visit to Kelly Sheerin, was key to the concept development phase:
- Kelly assured me that the market research I had done was valid and saw a real point of difference in the concept I was proposing. The graduation concept could be expressed in a number of ways through the design.
- It was discussed that a third, more radical stage of graduation might communicate the essence of the barefoot philosophy effectively. A super minimal sleeve might attract a broader range of users.
- With regard to forefoot stability; an independent strap that visually ties into the style of the harness might be effective. People have different forefoot, rear foot needs in terms of fit.
- With the mid-cut style of the design, its important not to take the heel counter two high up the Achilles heel. This is a problem area for most people.
- We agreed that the modular midsole concept was worth pursuing; but it was recognised that there was a danger of spending to much time resolving the mechanics of this feature.
- The patterned sole has parallels to a popular new balance minimal shoe. From his experience with this shoe, the placement of the circular studs should be carefully considered. ‘Dead spots’ in the tread pattern were very uncomfortable when encountering uneven surfaces.
- The washability of the inner sleeve, as well as a knitted washing bag was well received.
- Aesthetically, Kelly appreciated the concept and saw it as a unique approach to a saturated area of design.
- He advised that I focus on resolving the complete design to the best of my ability, and accept that there may be a few unresolved components to the subsequent stages of the concept.
- The concept was viewed as 70% of the way developed, with the next stage very much about designing out complexity and simplifying the design from a more pragmatic perspective, i.e. aesthetic, comfort, fit, weather proofing usability.

Secondary Experts:
Dialogue with a physiotherapist and a sports science researcher in the field of anti-ergonomic design has also been helpful for concept validation.

Company Input:
Feedback from ‘Tobe’ has been invaluable. Similar to the conclusions of my meeting with Kelly, I was encouraged to keep pushing the current direction, anchoring the concept in usability. I was reminded that the key consideration with footwear is that it is simple and easy to use. We instinctively know and understand footwear and this should be recognised and honoured as I look to reinvent aspects of the user experience.

Users
Using concept artwork as a method of discussing the projects core ideas has allowed me to receive valuable feedback. The fictional personas helped me to identify potential users. I was able to listen to the opinions and suggestions of others while I resolve the design.

Designers
Positive feedback from the senior footwear designer at ‘Tobe’, has been useful for gauging the success of my design direction. Often overlooked, my studio colleagues have had a significant impact on the direction of this project. Collaborative prototyping sessions have been the instigator for many design breakthroughs throughout the year.

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Clarifying the core concept of the design allowed for a deeper level of resolution at the back end of the project. There were two potential options for structuring the design:

**Concept refinement:**
This direction was modelled after the ‘graduation’ moonboot design of 2009. A user would begin running in the complete shoe (sleeve and harness), before graduating to a less supportive running sock. The final stage would allow the user to run in a sandal form with minimal support.

**Eco-system:**
This response was inspired by the cartridge system in the domestic first aid design of 2010. Replaceable cartridges with different supplies catered to varying first aid needs in New Zealand homes. In a similar way, minimal sleeves that offered varying levels of support and weather proofing would install into the exo skeleton design.
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Selected Direction:

Reflecting on feedback from both expert and business contacts, the notion of usability was constant. Previous design projects in my degree have often struggled to resolve concepts through the pragmatic lens of usability. This was a key criticism from my honours year examiner when reviewing my hybrid emergency device.

Based on these reflections, an ‘ecosystem’ interpretation of the current concept was selected. It was concluded that this decision would provide the best opportunity to resolve a pragmatic, usable design solution.
One of the most intriguing design implications afforded by the minimalist running movement, is its relationship to sustainability frameworks (Shedroff, 2009). The movement demands a drastic reduction in foam and cushioning materials to maximise sensory feedback. Human behavioral change will be the catalyst for a move toward sustainable living (Manzini, 2003). Minimalist running, acts as a suitable metaphor in human behavioral change and its affects on material consumption.

Systems thinking:
A system is more than the sum of its parts. It may exhibit adaptive, dynamic, goal seeking, self preserving, and sometimes evolutionary behavior (Meadows, 2008).

The possibilities of how this product could be re-interpreted stretch further than the simplicity of the two parts in the design. The concept could be customised based on style or performance, and parts could be replaced and repaired across the life of the shoe. A systemic approach also draws into question how the packaging of the product might support an ongoing customer business relationship.

Material reduction:
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cycle eleven
september 5 - september 20
five point plan.

i  sleeve designs
ii  sole profile
iii  tread mechanism
iv  toe cap
v  seatbelt clip

This simple logo was based on the ‘X’ and ‘O’ design language of the concept. These symbols represent the strapping configuration of the harness, along side the patterned dots across the sole. More subtly, these symbols can be seen in the stitch patterns and embossed textiles on the ankle sleeves. Two variations of the design could be used for the shoe; a ‘cropped’ version might be suitable for small rectangular tags.
Concept mapping:
As pictured on the previous page, the design could be worn in two strapping configurations: either a low top or an ankle high version. The more supportive high top configuration would thread through a buckle on the inner sleeve (left).

Below: Mapping out a potential system between product, user and company. This concept explores how packaging might facilitate washing, while also transporting parts for replacement or repair.
Refinement

As the design evolved, I began incorporating prototyping activities such as seaming, textile dying, decal transfers, clay modelling, vacuum forming and resin casting. Knitting and detail embroidery was outsourced towards the end of the project, allowing time to iron out any discrepancies between design and manufacture.

Above: Dye samples on polyester straps. Polyester dyes turned textile a navy blue. Cotton dyes left the textile too pale.
Left: Clay modelling to resolve side profile of the sole.
Far left: Vacuum formed insert for modular sole concept.

Above: Successful interpretation of cropped logo design for small tags.
Left: Same file up scaled by manufacturer. Begins to read ‘c x’ instead of ‘o x.’
Below: Future strap samples used the un-cropped version of the logo design.

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Left: Clay modelling to resolve side profile of the sole.
Far left: Vacuum formed insert for modular sole concept.
Wool fibre: These creme coloured textiles are factory samples of the 'Tobe: fitwool'. While still in development, the material is very breathable, strong, comfortable and combats odor issues. I have been using a substitute wool textile throughout this brief, developing a concept around simple sock-like running sleeves. The close fit, washable sleeves could be worn without socks.

Below: Weather proofing TPU for the side walls of the running sleeves: heat transferred onto substitute wool textile and available in multiple colours.

Wool fibre:

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Below: Weather proofing TPU for the side walls of the running sleeves: heat transferred onto substitute wool textile and available in multiple colours.
cycle twelve
September 20 - October 5

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The following feedback was received with regard to design of the sole:

“You should have a strong sense by looking at a product what it should do. In this case I sort of want the sole to be slightly more moulded to form of the foot. A bit more suggestive of a running/performance 'shoe', then a sandal. It is more and more a feeling. I could almost see that strapping system on one of the 'Tobe' soles working really well.” (T.Brown, personal communication, September 14, 2012)

To explore the possibilities for the sole aesthetic, an existing Vibram [Hitchens, 2011] design was mapped onto the upper. The contours of this minimal sole follow the shaping of the human foot, reflecting the application of barefoot running and defining the concept as a running 'shoe' (left).

I have learnt that the usability of a design is directly related to the 'visual cues' that indicate how a product should be used. How might a sole design remain true to the angular visual language of the upper while embracing contours of a minimal running sole?

In response to the feedback from 'Tobe:', the company’s running sole was combined with the upper developed through my research (above). This was a surprising synergy between the strapping harness and the existing sole, asking questions of how 'Tobe' might further develop upper designs for minimal running footwear.

Lateral studs:

Earlier process work explored the possibility of stretching a rubber outsole over more rigid studs; the difficulty in using this function lead me to explore a much simpler and more secure system. A very basic modular prototype held together by stitching moving forward. Spreading the studs across the side walls of the sole would allow for a more secure interface between sole and sleeve. This intervention, combined with the semi enclosed toe cap would allow the inner sleeve to install into the harness in a straightforward, usable fashion.
The 2011 investigation into urban self-reliance was immersed in deep thinking around the role of design in fulfilling basic human need. Much of the project operated in an idealistic paradigm, and translating deep insights into a pragmatic design solution proved difficult.

The master enquiry has moved back and forth between deep thinking and design practice. This constant transition between ‘thinking’ and ‘doing’ has been key to establishing project momentum. More pragmatic design solutions underpinned by deep thinking have arisen from this approach to theory and practice.

Process reflection:

Thinking and doing

The 2011 investigation into urban self-reliance was immersed in deep thinking around the role of design in fulfilling basic human need. Much of the project operated in an idealistic paradigm, and translating deep insights into a pragmatic design solution proved difficult.

The master enquiry has moved back and forth between deep thinking and design practice. This constant transition between ‘thinking’ and ‘doing’ has been key to establishing project momentum. More pragmatic design solutions underpinned by deep thinking have arisen from this approach to theory and practice.
Running Route:

Earlier, I described how my regular running route allowed me to reflect on the project and consider new ideas. Lawson (2005) criticises the notion that design process can be mapped out in a series of planned activities; designers should allow for an explorative dimension to their process, which might include intuitive or non-goal-oriented activities.

My running route through industrial Onehunga was an example of a non-goal oriented activity. The familiar scenery developed as the context of my research and helped me to imagine the scenarios this product might used in. Towards the end of this project phase, I began to photograph the most iconic scenes from my running route.

Bag:

A knit wash bag is a core element of the product eco-system. The bag is part of retail story, but would also be used for washing the removable sleeves. Researching online blogs, it was found that a person would use a pillowcase to protect shoes from scuffing and prevent damage to the washing machine drum. The goal of the sleeve design, was to reduce, if not eliminate the need for any adhesives that might be affected by machine washing.
project state october 5th
Design evaluation

This evaluation consists of two sections: a personal reflection on the initial design brief (page 44) and a review of feedback from 'Tobe:'.

Personal reflection:

Working steadily in an unfamiliar field of design, has resulted in a unique product response. The design consists of radical, conceptual elements such as the modular mid-sole solution, alongside more pragmatic interventions, such as the strapping harness.

Successes:
- Multiple strapping configurations and sleeve styles, allow a runner to monitor their transition to minimally supportive, footwear. This concept grew from the tension between minimalism and support and has facilitated a unique enquiry into this subject.
- To teach the runner about correct strike pattern, the sole has been designed with a target forefoot wear area. The replaceable midsole tread studs are worn down independently to the durable outsole, studs would vary in density and size depending on their application.
- The concept has begun to develop a modular footwear eco-system, based on only two manageable parts.
- Historic footwear inspiration has been interpreted in a contemporary fashion. The sock like structure of the inner sleeve and harness system, reference iconic minimal footwear solutions of the past.
- The minimal design aesthetic lends itself to be used for either running footwear, or casual attire.

Critique:
- The mechanism for the modular sleeve system is a core element of the concept. Specialist expertise and manufacture would be required to achieve a secure, yet removal midsole that was easy to use.
- Modest project funding has had a direct influence on the design process, requiring strategic, cost-effective prototyping decisions. This has been limiting factor in the concept's development.
- This project revolved around personal testing and reflection. In developing the project further, extensive user testing would allow for a more rigorous interrogation of design decisions.
- The reusable packaging would facilitate maintenance by machine washing, also functioning as a means of transporting parts between company and customer. This system needs to be refined and tested in order to be proved viable, for example, how would the packaging remain durable travelling back and forth from company to customer?

Review of Feedback from 'Tobe:'

Design work to date has been well received by 'Tobe:' The work I presented told a clear and compelling story. I was encouraged, to look into the sculpting of the sole in order to differentiate the shoe from sandal-like geometry. 'Tobe:' described the value of this research:

‘You have tested the overall ‘Tobe:’ visual language or kit of parts. What is interesting to me how well that has stood up. Our aesthetic prescription is very strongly utilised in your work and I see that as a compliment to the process as a whole. Secondly, it provides you to take on that aesthetic language and the ‘Tobe:’ story as you understand it and be uninhibited by some of the constraints we have dealt with through the project proper. Certainly you have considered them but manufacturing, budgets, team building and relationships within the process, amongst other things can be removed from your process to streamline a creative output and I think that leads to freer generation of concepts and freer innovation. In summary, your direction is fresh and very interesting while retaining a strong linkage to the ‘Tobe:’ ethos... You bring a fresh voice to the conversation around our development of a running shoe. It has been inspiring for all of us – Jamie, Mike and myself – who have worked with you around this project both as an intern and in the context of your independent work. Hopefully it is the start of a longer association.’

(T.Brown, personal communication, September 14, 2012)

This industry feedback helped me to gauge the success of this conceptual footwear exploration. It was valuable to hear what the company has received from the relationship thus far.

3.5
4.0

Enabling design: a journey
Meaningful change seems increasingly inaccessible to young designers. There is both a danger in being paralysed by heavy, unsustainable design theory and frameworks, or in fanning the marketing ‘greenwash’ (Green, 2009). How can a young designer make responsible decisions with regard to the mandate for sustainable design? This project has helped me formulate a personal philosophy and strategies for meaningful design.

Section 2: Enabling and Disabling design

Morrelli (2007, p.5) contends the idea that "sustainability is a point of negotiation. Designers need to understand the knowledge and skills to make everyday systems more sustainable. Sustainability is an enabling factor for many design practitioners". This project showed that the main driver for product development is to design based on the misguided attempt to ‘relax’ people from routines of everyday life. (Morrelli, 2007). ‘Our dependence on convenience is at an all time high’ and is having a direct effect on the wellbeing of the planet (Nevala, 2012). Morrelli (2008, p.4) speaks in a similar vein, suggesting that in the past, the knowledge, skills and know-how enabled us to deal with the diverse facets of daily living.

Both Manzini and Morrelli centre their arguments around the notion of behavioural change in order to achieve empowered, sustainable living. This is the central theme that has evolved through my design education; I have sought to investigate how, through a more considered approach to running, minimal running as a Case Study (Ciegis, 2009).

Over the last 30 years the relationship between designers, environmental degradation and economic viability and environmental considerations have been found itself integral to the problem. The design profession has been confronted with the charge of responding to these massive global issues (Morelli, 2007, p.5). ‘Our dependence on convenience is at an all time high’ and is having a direct effect on the wellbeing of the planet (Nevala, 2012). Morrelli (2008, p.4) speaks in a similar vein, suggesting that in the past, the knowledge, skills and know-how enabled us to deal with the diverse aspects of daily living. Both Manzini and Morrelli centre their arguments around the notion of behavioural change in order to achieve empowered, sustainable living. This is the central theme that has evolved through my design education; I have sought to investigate how, through a more considered approach to running, minimal running as a Case Study (Ciegis, 2009).

...
for the cause of sustainability. Products are to be ‘fertile’, having development and adaptation potentials, involving consumers in designing the final shape and function. A product should possess ‘buy in’ qualities, empowering the user to define a product according to their specific needs. I believe that meaningful personal identity found in a product, works against impersonal, blind consumption. The ecosystem of products proposed in the concept aims to establish a lasting business-customer relationship. The replaceable repairable parts encourage user to maintain this product.

In Design for the Real World, Papanek (1984) proposes that the ultimate job of design is to change human environments and tools, and thereby change humans themselves. Papanek (1984) believes that behavioral change is the core issue when confronting sustainability. Through this project, I have asked how a product might facilitate behavioral change amongst runners.

To make a speculative comparison based on my learning of the barefoot running movement; conventional footwear can be likened to a ‘crutch’, keeping runners dependent on specialised equipment in order to engage with the practise of running. The graduated moonboot designed in 2009 (figure 1) initiated my journey into enabling design. In a similar way to the moonboot, this concept functions as a ‘tool’ empowering runners by fostering the forefoot technique proposed by experts (Saxby, 2011). The ability to customise the design encourages a user to ‘buy in’ to a system of responsibility manufactured footwear components. (Sapngenberg, 2010, p.1491). Involving consumers in designing the final shape and function of this concept, enables a user to control their journey towards minimal running.

Building on my learning from previous design projects, this master project has practically explored the area of minimal running with regard to ‘enabling design’ (figure 1). This project has been part of a continual journey into discovering myself as a designer and has demonstrated how tangible, product responses can develop from a more pragmatic attitude to sustainability and design.

Design project

Enabling design
"A product that ... encompasses the scientific approach to injury prevention (a graduated introduction to minimalist running), with the cultural dynamics of the Mexican huaraches and the durability of modern materials that are practical and eco-friendly. Great to share the journey with you."

- Kelly Sheerin (AUT Millennium Institute Running and Cycling Mechanics Clinic Manager.)
Proposed Stewardship model

This diagram maps out a potential model for establishing a more lasting, customer-business relationship.

(The shoes are sold in a durable, knitted bag.)

(The user may remove the sleeves from the harness.)

(The shoes can be configured in two ways, for varying degrees of support.)

(The sleeves can be machined washed in the knit bag.)

(When the sleeves wear out, they may be resoled or recycled.)

(Parts are sent back to the company for recycling or repairs.)
Innovation can be found through exploring ‘contradictions’ and tensions in a field of design. Through investigating the tension between minimalism and support, a unique product system has been developed.

This project has developed a rhythm of ‘thinking’ and ‘doing’. More pragmatic design solutions underpinned by deep thinking arise from this approach to theory and practice.

Masters study has developed my personal framework for responding to sustainability. A product and its story can be used to foster behavioural change for the cause of sustainability through practical design methodologies (such as design for disassembly or stewardship schemes).

Conceptual projects with existing companies:
1. Allow the student to exhibit their process in front of potential employers.
2. Allow the company to explore the flexibility of their brand.

Through this project I have demonstrated my approach to the field of minimal footwear. For ‘Tobe’, this relationship has enabled a conceptual level of design that they would not otherwise have the resources for.


References

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Appendix 1

Concept a:
This model was built to prove the overarching design concept of minimalism and support. A fit wool substitute was used for a simple toe box. A Nike ankle sleeve provides structure to the prototype. A nylon woven strap provides a low level of support.

Reflections:
This model was successful in validating the core concept of minimalist running footwear and ankle support. The running experience proved to be very unique, taking on the feel of a 'structured sock.' The ankle sleeve and strap acted to encase the foot whilst the material elasticity provided a subtle bounce to each step.

Concept b:
This model explores how a strapping component may integrate with the upper form to provide both midfoot and ankle support. An asymmetrical woven design provides an interesting contrast to the simplicity of the wool fibre textile. The length of the straps has been exaggerated in this model to illustrate its connections to historic, while lacking footwear such as the Greek or Mexican running sandals.

Reflections:
This image helps to frame the design intent of this project to investigate new directions in the field of performance footwear. A woven design language could be expressed throughout the whole object, ultimately taking root in the nature of the woven, 'Tobe:' fitwool. Working with these materials has illuminated the need to execute clean, slick material finishings against the authentic woven strapping aesthetic and the 'Tobe:' wool textile. This prototype has also drawn attention to: A) the opportunity for a modular strapping system, (B) the line between casual and running footwear and the reflection of this trade off in the design, C) the impracticalities and potential hazards of lengthy straps in running footwear.
Sterile: sterile unless individual wrapper is opened or damaged
Directions: Skin should be clean and dry before using dressing. Change dressing daily.
Single use only.
Store in a cool dry place.

Appendix 2