

Future Archaeology 6.0 : exploring the fashion designers practice for the future

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FUTURE ARCHAEOLOGY 6.0:
Exploring the fashion designers practice for the future

FIONA BUCKINGHAM
MASTER OF DESIGN (HONS)
UNSW
2018



Australia's
Global
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Thesis Abstract

There is startling evidence that we now have a waste problem - too much waste, limited resources and the over-consumption of products- in particular, fashion and clothing that is discarded and thrown into the landfill. We are using technology to create faster, bigger, more, cheaper, disposable products. Technological innovation has accelerated the process of designing and selling clothes so that clothes now lack value, creativity, craftsmanship and are designed for obsolescence. Current industry practices have placed pressure on fashion designers to create for price and profit rather than quality, craft or innovation. In an increasingly mobile society and workforce, individuals lack a sense of belonging and attachment to place, things, or culture. People have little connection to the clothing worn and removed from the manufacture of the products they purchase.

This research dissertation critically examines the fashion cycle and supply chain to highlight its inefficiencies and waste, fashion practices and the role of technology in developing fashion and clothing. The research addresses alternative working models and creative strategies that could augur the way toward a more democratic, participatory, and socially conscious industry and enable contemporary fashion designers the relevant skills to become sustainable practitioners in the production of fashion and clothing.

Through practice-based research, it has investigated a range of materials, fabrications, and processes such as handcraft techniques, along with digital technologies including 3D prototyping and printing. Experimental and exploratory research methods have been used to create a series of artefacts that minimize resources, consider product lifecycle, to create value in clothes that encourage consumers to keep, use less, repair and then recycle their garments.

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Thesis Abstract

Future Archaeology 6.0: exploring the fashion designers practice for the future

Keywords; Fashion design, sustainability, fashion systems, technology, fashion practice

There is startling evidence that we now have a waste problem - too much waste, limited resources and the over-consumption of products- in particular, fashion and clothing that is discarded and thrown into the landfill. We are using technology to create faster, bigger, more, cheaper, disposable products. Technological innovation has accelerated the process of designing and selling clothes so that clothes now lack value, creativity, craftsmanship and are designed for obsolescence. Current industry practices have placed pressure on fashion designers to create for price and profit rather than quality, craft or innovation. In an increasingly mobile society and workforce, individuals lack a sense of belonging and attachment to place, things, or culture. People have little connection to the clothing worn and removed from the manufacture of the products they purchase.

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Through practice-based research, it has investigated a range of materials, fabrications, and processes such as handcraft techniques, along with digital technologies including 3D prototyping and printing. Experimental and exploratory research methods have been used to create a series of artefacts that minimize resources, consider product lifecycle, to create value in clothes that encourage consumers to keep, use less, repair and then recycle their garments.

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Definition of Terms

Couturier: a highly creative and skilled technician or artisan, perceived to be the best in the craft of fashion design and tailoring. A couturier works within Haute Couture.

Drape: French term, *moulage*, the act of draping fabric onto a body or mannequin of a standard size to create a 3d shape or pattern for a garment.

Fashion: is an ambiguous term to define, and much research and discourse has been written to define its meaning. It is accepted, in modern terms, that fashion is intrinsically linked with culture, and as fashion flows from culture, it describes the sentiments, habits and views of a whole population within any give period (Leppens). Social theorist Perrot writes that 'fashion' is a particular style or dress that is popular at any given time; hence, the term 'in fashion' is something that is adopted temporarily, on the basis of collective but ephemeral preferences (Perrot 1994).

Fashion designer: a modern term implying a skilled creator who designs and produces original ideas but works with a team or for a company to produce fashion garments. A trained creator to develop original ideas from researched concepts to create fashion garments.

Fast fashion: a contemporary phenomenon that requires products to be manufactured in a short production cycle. It is highlighted by the imitation of fashion trends based on high-end designer catwalk collections. Highly trend focused and sells itself by delivering fashion trends at a low price and typically relies on developing countries and low socio-economic communities to produce its product.

Haute Couture: original garment of high quality and high standards made to measure garments by highly skilled artisans. The Haute Couture name and brand remains protected by copyright of the French Federation CSCP and is retained within the Parisian region.

Mass market: the market for fashion goods that are produced in large quantities. Have universal appeal and in therefore rarely innovative.

Pret a porter: is a French term with the accepted translation as ready-to-wear. It implies a designer has been involved in designing the clothes; it also implies off-the-rack clothing. It is more mainstream than Haute Couture and is industrialised in production methods and garment make.

Patternmaking: creating a garment by drafting measurement onto paper or cardboard to create shape and patterns of garment structures and components.

Product developer: a person who works for a large organisation or fast fashion brand who imitates, buys and copies other designers' products. A product developer produces garments that tend to be trend focused.

Slow fashion: as opposed to fast fashion. It is a movement of designing and buying garments for quality and longevity. Slow fashion encourages slower production schedules, fair wages, and sustainable garments that minimise waste.

Sustainable Fashion: Sustainability in fashion and textiles foster ecological integrity, social quality and human flourishing through products, action, relationships and practice of use. (Fletcher 2014)

Trend: a trend is defined by a shift in behaviour or mentality that influences a significant amount of people.

Toile: patterns cut out in fabric; a toile is usually made of canvas or calico and used for garments and design prototyping. It helps analyse and assess a design, style and fit of a product prior to finalising the design for production.

VOLUME I

Chapter I: Introduction to the Thesis

I.1 Aims of the study

The focus of this research project is to critically examine fashion practice, specifically related to the design, production and supply of clothing for a contemporary marketplace. The principal outcome of the study was to gain an understanding of the future direction of fashion practice for designers, from a designers' perspective.

With our current environmental concerns, natural resource depletion, shifts in economic and social circumstances, and revolution in communications systems, how we make, wear and regard our clothes has changed drastically in the past two decades. This thesis documents the research on how these aspects are impacting contemporary fashion and clothing.

The initial aim of this study was to examine the fashion cycle and how it has evolved from Haute Couture to ready-to-wear, and to what we today call fast fashion. Historically, the fashion systems developed and adapted predominantly in Europe. The research explores the role and influence of technology in the fashion cycle, supply chain and fashion practice over the last 100 years. The study surveyed a selection of contemporary fashion designers whose practice challenged conventions, and experimented with new technologies, materials and processes to develop innovative fashion clothing and products. This research was fundamental in informing my explorative, studio practice.

In conjunction with this thesis is the creation of a body of work—a series of six garment artefacts that challenge the typical fashion status quo of producing and selling 'fashion' clothing and products. The series incorporated systems, techniques and materials that have been researched and developed over a four- year period. The work presented in an exhibition provides a space for the viewer to interact and engage with the pieces, their production, materials and wear.

1.2 Thesis plan: chapter outlines

The thesis is divided into two volumes—Volume 1: Research Document and Volume 2: Studio Research.

Volume 1 is divided into four main chapters: Chapter 1, Introduction to the Thesis; Chapter 2, Concept to Consumer; Chapter 3, Re-designing Fashion for Tomorrow's Wardrobe; and Chapter 4, The Digital World. Each chapter includes an introduction, a summary, and distinct subheadings to provide a framework for the thesis.

Chapter 1: Introduction to the Thesis outlines the potential, aims, opportunities and outcomes of the project. Chapters 2, 3 and 4 document the research theories, with each chapter divided into distinct areas of research.

Chapter 2: Concept to Consumer establishes the historical context of the fashion cycle and supply chain to help understand its relevance to the contemporary fashion business, supply chain and production methods. It draws on academic research to investigate and contextualise the role of technology, industrialised methods and the internet in the production of fashion clothing. This chapter examines current industry practices of the supply chain, the lifecycle of the fashion garment on producing clothing, and the environment. Moreover, it brings forth ideas about altering the growing rate of consumption and the growing need to change the fashion system to one that is more ecologically sound.

Chapter 3: Re-designing Fashion for Tomorrow's Wardrobe outlines new developments in the production of fashion clothing and related products. It builds on scholarly research in sustainable design and its methodology. It argues the need for repositioning the current fashion's fast production cycle to one that is more open, transparent and collaborative. It explores how participatory design that includes both designers and consumers could lead to the development of new systems outside that of the current economic model.

Chapter 4: The Digital World examines technology and designers' practice. It surveys leading fashion and product designers' use of technology and the innovative practices, new business, technology and materials being used to disrupt the traditional supply chain and fashion cycle of producing clothing.

Volume 2 links the written research and studio component. In the interest of clarity, these chapters follow sequentially from Volume 1, starting at Chapter 5, which includes the product rationale. Chapter 6, Elements and Processes examines the studio design process for developing the series of six prototyped artefacts. Chapter 7, Future Archaeology 6.0 Exhibition details the exhibition and presentation of the studio outcome. Volume 2 ends with a final conclusion.

1.3 Significance of the study

By identifying the historical development of the fashion system and fashion supply chain, I have come to understand the significant challenges facing the fashion industry to date. Examining the fashion cycle and researching design and production methods highlighted inefficiencies and waste, which led to the formulation of the initial question:

How can contemporary fashion designers design and produce clothing that consumers are effectively and subjectively 'attached' to so that the garment inspires enduring use?

The research explores these sustainability issues from a design perspective. Building on academic research on sustainable design, I have deepened my understanding and specialist knowledge on its process and practice, and laid a solid foundation to develop products that have a more humane and less detrimental effect on the environment.

An extensive survey of contemporary fashion designers' practices looked at how they develop clothing and fashion products by challenging conventions and experimenting with new technologies, materials and processes. This survey has identified new methods of practice, providing insight into future directions as a designer and researcher in the fashion industry. The surveyed designers included Issey Miyake, Martin Margiela, Iris Van Herpen, and Victor & Rolf, all provided inspiration and formed the basis for my studio experimentation. The research dissertation provides a resource and critical pathway for future designers and potential niche opportunities in fashion practice. This investigation has deepened my research expertise, personal experience and professional practice, which will enhance my academic and industry profile in this field.

1.4 Outcomes of the study

The principal outcome of the study was to gain an understanding of the future direction of fashion practice for designers, from a designer's perspective. The research offers alternative working models and creative strategies that could augur the way towards a more democratic, participatory and socially conscious industry. In doing so, it empowers contemporary fashion designers with the relevant skills to become sustainable practitioners in the design and production of fashion and clothing.

Through the examination of contemporary designers and documentation of my creative practice, new transformations for fashion and textile design are presented. The research offers fresh perspectives on fashion that expand its possibility and practice through collaboration and active participation, and enables design sustainability and thinking throughout the designer's creative process.

1.5 Limitations of the study

1.5.1 Fashion system

The examination of the fashion system and its consumption is a much broader topic than can be explored in this research project. Focusing the research specifically on the fashion cycle has enabled the research to be contained and completed within the study's timeframe. Consequently, all aspects of the fashion system—namely textile production, advertising and marketing—are not covered in this document.

1.5.2 Fashion theories

Identifying the fashion cycle and supply chain revealed intersections with several research themes and theories. Fashion discourse examined and published over the last century on 'fashion theory' provided historical context to the fashion system and the spread of fashion. Due to research focus and word constraints, well recognised and accepted theories within the fashion and textile sector are utilised in the analysis of the spread of

fashion; for example, terms such as 'trickle-down theory' are used rather than undertaking a full examination and theoretical study of fashion.

1.5.3 Economics

The research system's approach is industry facing and practice-based, and it was imperative to examine the relationship between fashion, economics and the broader economic system in which it operates. The fashion industry holds a crucial role in the global economy, so it is essential to discuss its interrelationship within the context of the fashion supply chain.

As Sandy Black (2007, p. 299) observes:

Fashion and clothing are part of a universal experience, the textile and clothing industries occupying a powerful global position both economically and in socio-cultural terms. Individuals have a strong personal relationship with clothes, one that is intimate and passionate, bound up with personal expression and identity. Fashion is, however, a field that is under-researched and underrepresented academically. Fashion is a fast-moving industry often condemned as frivolous and unimportant but represents one of the major economic players on the global stage.

Research revealed that new developments in the production and retail of fashion and textile products show a fundamental shift in the broader fashion and design sectors that do not align with traditional economic business models. While this is addressed in the study, the analysis of fashion economics in Chapters 2 and 3 are of an elementary nature, as an in-depth discussion of economic theory is beyond the scope and limitations of this project.

1.5.4 Technology

An examination of the role of technology in the fashion system over the last 100 years found that it has been instrumental in the process of developing the fashion and clothing that consumers purchase today. Fashion technology and computational design is an emerging field of study, and there is limited scholarly research published to date on its practice within the fashion and textile clothing sector. This study examines its impact,

specifically on the supply chain and the system of producing fashion and textile related products. The research was conducted through professional industry publications, along with the researcher's own observations and documentation of exploratory practice in the studio. While the impact of the internet on the fashion supply chain is discussed, more rigorous and scholarly research needs to be done to document its theory and impact that is beyond the scope of this thesis.

1.5.5 Studio practice

The studio research is an experimental and exploratory study of alternative creative practices that are proposed to address the research question. Limitations on each of the individual garment styles are set. These limitations include raw materials, design restrictions, construction methodology and considerations made for retailing the original prototypes (further details are provided in Volume 2, Section 5.2).

1.6 Background

The premise of the research dissertation stems from my professional practice within the Australian fashion industry. Working for over 12 years as a commercial fashion designer for Kyotap, a contemporary ready-to-wear fashion label I founded in 2001, the brand's vertical retail store operated in Sydney from 2003 to 2011. Since Kyotap's inception, I designed, produced and sold nationally over 12 commercial collections and was invited to participate at Australian Fashion Week in 2008. I also exhibited fashion and conceptual work at selected Sydney galleries in 2006, 2008 and 2010, with my work featured in several leading fashion and travel magazines.

In Australia during the late 1990s and early 2000s, fashion brands relied heavily on producing copied garments from international fashion houses and designers, namely in Europe, adapted for the mass retail market (Leppens 2000). There were very few fashion brands operating within the ready-to-wear designer¹ market segment (Leppens 2000), and these included Morrissey & Edmiston, Akira Isagowa, and Collette Dinnigan. The work of these designers showed that there was interest and consumer demand for original and creatively designed fashion product in Australia, and their success provided

¹ For me, this market relates to designers who produce creative collections that are innovative and original, rather than copies of trends or styles produced by other fashion designers.

opportunities for new designers and brands to move into that segment of the market. In the following decade, many independent fashion brands, including Kyotap and other designers such as Kimmily Johnston,² Gorman and Zambesi, moved into that market area.

Kyotap sat within the Australian ready-to-wear 'designer' market as it employed original and creative ideas in design. The fact that it operated as an independent vertical retailer allowed some further flexibility in its product offering and business model, but it remained part of the broader traditional fashion system. Each year two seasonal collections were produced, consisting of a spring/summer and an autumn/winter range. The garments were design-focused rather than trend-focused and distributed through several channels including online, the Sydney retail store and wholesaled nationally to boutique fashion businesses. The contemporary trans-seasonal styles were developed with a sustainable approach and garment lifecycle was carefully considered in the design development and construction methods. Styles were designed for longevity, with recycling and re-use in mind. Local design and product manufacture allowed more autonomy, with product development, streamlining production, reduced costs and emissions from transportation of goods and, most importantly, local industry support. These employed techniques are examined further in Volume 1, Chapter 3 and Volume 2, Chapter 5.

In terms of fashion practice, I have a keen interest in digital technology, sustainability and ethical practice, implementing these into my creative processes and core business values. This research dissertation further expands on that knowledge.

Digital technologies employed included a brand website in 2006, which was considered innovative at that time, with a further site update to include an e-commerce store in 2008. The web platform was suitable for both computers and handheld devices such as smartphones. In 2011, the site transitioned to an online business. Digital processes adapted in garment development included computer-aided design (CAD) programs for designing, digital printing, patternmaking and grading systems.

² Kimmily Johnston is a highly acclaimed, award-winning Australian designer and creative director. The brand operated from 2002 to 2012, and at its peak ran three retail stores, an online store, and sold to more than 80 stockists worldwide, including David Jones department stores in Australia, Joyce Boutique in Hong Kong, and Midwest in Japan.

The demand of producing creative seasonal collections, financial and time constraints, the increasing speed of product turn-around, and the pressure of faster, cheaper price points led to re-evaluating my professional practice and questioning the systems that had been in place within the fashion and textile sector for many decades.

In the last five years of my teaching academic career from 2012 until 2017, I have witnessed the rapid changes in the fashion industry's business models through fast fashion. These encompass new design work methods, a restructuring of the designer's studio, and the proliferation of technology and innovation into creative practice. This led to me wanting to examine the future challenges for fashion designers, the industry and the broader sector's environmental and social impact.

1.7 Literature review

1.7.1 Retracing the fashion system

For clarity, the thesis is divided into three main chapters. The first chapter retraces the historical development of the fashion system to its current practice. The thesis relies on scholarly and published research to date on fashion theory. Retracing the fashion cycle provided the background information to contextualise fashion;³ and the broader fashion system in which it operates. Identifying the fashion system's significant shifts and cultural values in Haute Couture, ready-to-wear and fast fashion was significant for the research, as this provided an understanding of the spread of fashion and its increasing consumption patterns within our modern society. Understanding why fashion is purchased is imperative to giving an overarching perspective of the fashion system, and identifying future directions and changing practice in the fashion and textile clothing sector.

1.7.2 Sustainability in fashion

In recent years the fashion and textile sector has been subject to much public discussion and criticism of its industry practices, especially with evidence of poor working conditions for garment makers in the fast fashion business model.

³ Fashion is an ambiguous term to define, see definition on page XIV, chapter 2 and 3 where the aspects of fashion and clothing are covered in more detail.

Over the last decade, scholarly research published on sustainable design in fashion and textiles highlights inefficiencies and waste through fashion practice and provides evidence of the environmental impact and human cost of affordable trend-based clothing. Leading academics and authors in this field Kate Fletcher (2008, 2016)⁴ and Sandy Black (2008,2012)⁵ examine the fashion system, the supply chain and, in particular, the fast fashion business phenomenon. In her 2008 book *Sustainable fashion and textiles*, Fletcher explores the lifecycle of a fashion garment and documents the impact of producing that clothing has on the environment, from raw material to end use. In *Eco-chic: the fashion paradox* (2008), Black examines the complex nature of fashion and the contradictions between its economic importance and inbuilt obsolescence and wastefulness. Their work in the field of fashion sustainability theory and practice provided the research foundation for this study and influenced the direction of the creative practice and experimentation of outcomes explored. These theories and practice are detailed in Chapters 2 and 3.

Sustainable design requires a fundamental shift throughout the entire supply chain in the fashion and textile sector, with a careful selection of materials, production, manufacturing, design consideration, and consumer patterns of use and disposal needed (Fletcher 2010). Consumption of fashion and textile products needs to change to one that is more ecologically sound and at a slower rate of consumption. However, making products last longer and using design strategies that improve both physical and emotional durability, and setting agendas for waste minimisation through reducing, recycling and re-use, have the most beneficial impact (Fletcher 2010, 2012).

1.7.3 Future Directions

Over the last few decades, creative practice has undergone a computing revolution. Contemporary designers are challenging traditional practices and defining new codes of practice by creating hybrid methods through integrating technology with age-old craft techniques to explore an array of shapes and forms, producing new directions and

⁴ Kate Fletcher's background in sustainable design is extensive, and she has published several books on sustainable design in fashion. Her work is the principal text in academic seminar rooms and commercial studios in investigating sustainability in fashion and textiles. Her most recent publication, *Craft of use: post-growth fashion* (2016) presents alternative practice and uses for garments.

⁵ Sandy Black has published several books in the field of sustainable design, including *Eco-chic: the fashion paradox* (2008) further details in the bibliography.

experimental outcomes in fashion and textile design. Digital and analogue fusions are defining new contexts for the innovative fabrication of surfaces, products and environments (Braddock-Clarke & Harris 2012). Prominent fashion designers and houses are utilising innovative collaborations with computer engineers, technicians and scientists in their seasonal collections and catwalk collections. These include Iris Van Herpen, Issey Miyake and Hussien Chalayan, which are further detailed in Chapters 3 and 4.

Professional industry journals such as *Textile View*, *TrendTablet* and *Ragtrader*, all reveal new paradigms in the production and sale of fashion and textile design. These publications suggest changing lifestyle, environment and human needs. Articles discuss societal changes and how sustainable and social design are becoming part of the broader mainstream landscape of fashion and textile design. As *Textile View* (2012) states, 'creating a healthy balance between economic, ecological and spiritual growth; hedonistic sustainability and commercial idealism, new goods taste better, last longer and provide a greater satisfaction'.

Academic industry publications *Fashion Theory: the Journal of Dress, Body and Culture* and *Fashion Practice: the Journal of Design, Creative Process & the Fashion Industry* provided relevant and current research in the field of contemporary fashion and textiles.

1.8 Theoretical framework

The theoretical framework of the research project is transformational theory. It has an industry system focus and intersects with three main research themes: fashion practice, fashion and sustainability, and technology in a postmodern consumer society. The fashion and clothing sector has recently been undergoing rapid changes and disruption. The theoretical undertaking was to gain an understanding of how these changes will affect the future direction of the fashion designers practice. The key research theories are examined in Chapters 2, 3 and 4 from the designer's perspective and provide the framework for the experimental practice- based studio research.

1.9 Research methodology

1.9.1 Select research methods

A variety of data collection processes were utilised in the current study, including historical research, namely archival and secondary research. Archival research was conducted on clothing and fashion supply chain development from Haute Couture, ready-to-wear and fast fashion. Conducting historical research of the fashion cycle was a valuable foundation for the broader research project. Understanding the evolution of the fashion supply chain allowed the researcher to contextualise the development of clothing chronologically and gave an excellent understanding and awareness of the fashion clothing system.

Secondary research involved investigation into new technology developments in fashion. To date; there is limited published scholarly research into technology and the designer's creative practice. Research was conducted through a selection of industry and academic journals, observations of current innovations, industry standard documents, government papers and conversation in the broader community, along with the researcher's own professional practice and experience.

Primary and explorative research was conducted by surveying contemporary fashion designers' practices, examples of technological applications to fashion design, documentation of my current practices, and using experimental research methods in design development through practice-based enquiry of craft and digital techniques. This survey formed the basis of my experimentation.

1.9.2 Data collection

Data collection included secondary research and for surveying of contemporary designers' practice. Further research was collected through attending exhibitions in fashion and textile related areas. These were vital to gaining knowledge in a range of design practices and processes of fashion designers. In particular, the exhibition *Material at hand* at the Powerhouse Museum MAAS, Sydney identified new practitioners in this field and reconfirmed my ideas, the relevance of the research project and helped maintain the focus and direction of the dissertation. Attending European fashion exhibitions of high-end fashion designers helped identify comparable processes that have influenced and

expanded the researcher's knowledge in fashion practice. In particular, the *Margiela/Galliera 1989-2009* exhibition at the Palais Galliera, Paris provided insight into his work with recycled materials and how this methodology is successfully incorporated into commercial collections, which aligned with my own creative process.

Attending workshops in specialist technologies and digital programs such as whole garment knitting and 3D prototyping provided practical skills and knowledge for experimentation in computational design.

1.9.3 Processing and analysis

Processing and analysis was completed through the documentation of exploratory and experimental studio practice.

1.9.4 Reflective practice

Reflective practice applied to the researcher's studio research in the creative development of design iterations and is further examined in Volume 1, Chapter 4 and Volume 2, Chapter 5 and 6.

Chapter 2: Concept to Consumer

2.1 Chapter introduction

The purpose of this chapter is to retrace the development of the fashion system. It examines the evolution of the fashion cycle, past to present, from the Industrial Revolution to the current day. This chapter provides a background understanding of the historical relevance of the production and supply of fashion clothing, as well as an analysis of the fashion cycle that maps the critical transition points at which fashion methods changed direction. The chapter also examines the influence of technological advancements, the internet, class and identity through the wearing of clothing, the spread and speed of fashion, and its subsequent consumption to date.

2.2 The evolution of the fashion system

The rise of the bourgeoisie⁶ during the French revolution, changes to clothing sumptuary laws,⁷ and the Industrial Revolution paved the way for the democratisation of fashion and evolution of the fashion system we know today (Kawamura 2005; Leppens 2000; Perrot 1994).

Innovation and developments in manufacturing processes from the Industrial Revolution transformed rural societies into urban communities, created a higher standard of living and increased the wealth for the bourgeoisie (Crane 1994; Perrot 1994). Without regulation applied to dress, people were free to express themselves through costume and clothing. With the newfound status of wealth and power, the bourgeoisie began to dominate the norms of fashion and appearance (Perrot 1994). The adoption and spread of clothing became one of style and taste rather than rules and regulation, and clothing became

⁶ Bourgeoisie is the French name given to the middle classes of the 20th century.

⁷ Sumptuary clothing laws are used to control and regulate consumption. Traditionally they enforce social hierarchies depending on their social rank and were often used for social discrimination. For example, there were specific colours and materials for royalty and linen cloth or hempen for rural people; lower classes wore used clothing; and middle classes dressed in coarse fabrics, woollen twill on plain or dark colours (Perrot 1994, p. 25).

'fashion': a visual code entangled around an individual's set of beliefs, values, wealth and status (Bourdieu 1987; Leppens 2000; Simmel 1957; Veblen 1899).

As fashion was adopted, gender dress between males and females started to widen and differentiate. Women explored the nature of fashion, status and adornment with clothing and their garments were used to display family wealth, whereas men's clothing was streamlined, abandoned decoration and colour, and they wore badges of military power and rank to demonstrate their social status (Aspelund 2009, p. 21).

This new visual code of dress drove the spread and consumption of fashion. Social theorist Thorstein Veblen (1899) examined this in his essay *The theory of the leisure class* and developed a descriptive term called 'conspicuous consumption'. Conspicuous consumption is the desire of individuals to differentiate themselves and 'consume' clothing and artefacts to demonstrate their wealth and status rather than on the real personal needs of the individual (Veblen 1899).

By the 19th century, fashion was incredibly popular in Europe and Paris was considered the epicentre of what was fashionable. Many department and retail stores opened, and by 1844, 225 establishments were operating in Paris alone (English 2013, p. 12). Fashion, then dictated by the ruling classes, would appear on iconic figures. This would propagate outward to the court and the new bourgeoisie, and then outward still in increasingly watered down versions to the working classes (Bourdieu 1987; English 2013).

Social theorist Georg Simmel further expands on the spread of fashion through the class system and its social status with 'trickle-down theory' (Simmel 1957; Veblen 1899). The trickle-down theory is modelled on a social hierarchy in which the affluent seek to differentiate themselves and the people lower down seek to identify with the affluent by replicating their style of dress (Simmel 1957). In his essay '*Fashion*', Simmel (1957) observes that fashion satisfies the need of individuals to be different as fashions alters within the social classes: 'the fashions of the upper stratum of society are never identical with those of the lower; in fact, they are abandoned by the former as soon as the latter prepares to appropriate them' (Simmel 1957, p. 543).

2.2.1 *Haute Couture and the fashion cycle*

Arriving in Paris in 1845, English designer Charles Fredrick Worth revolutionised the way clothing was bought and sold (Aspelund 2009; Perrot 1996). At the time, the tradition was for fabrics to be ordered and sewn by a seamstress based on the preferences of the aristocrat.⁸ Worth persuaded his employer at the time, department store Maison Gagelin-Opigez et Cie, to allow him to sew dresses to complement the fabrics and accessories in-store. Dressing his wife, Marie Vernet, in the new designs attracted the attention of wealthy clients who appreciated the skilful tailoring techniques he employed (Perrot 1996). In 1853, with his wife, Worth broke away from the company to open his own made-to-measure business, the House of Worth, the first documented Haute Couture⁹ fashion house. He became Paris' first Haute Couture designer (Aspelund 2009; English 2013; Perrot 1996), marking the beginning of designer-led fashion design.

Many other designers opened made-to-measure fashion houses, and Haute Couture continued to grow and expand. By the 1880s, many Haute Couture designers had started selling models¹⁰ of their designs to be copied, particularly to the North American market (English 2013; Troy 2003). Foreign buyers would buy models along with reference slips,¹¹ giving them the right to reproduce them in their country. These reproductions became so good that it became necessary for designers and their couture houses to start attaching name labels to their products to identify the designer's original work (English 2013).

At its height in the 1920s the French fashion export industry was worth 2,500 million francs. American buyers were purchasing several dozen copies of models at 100,000 francs each to sell to their wealthy clients, and they also made thousands of unlicensed copies to sell at a lower price (English 2013, p. 35).

In 1868, Worth founded the French Federation Trade Union, a governing body to represent Haute Couture made-to-measure in the Paris region—La Chambre Syndicale

⁸ In fact, until the abolition of corporations during the revolution, it was established by law that tailors and dressmakers were not allowed to stock and sell fabrics and therefore could not produce ready-made garments.

⁹ Haute Couture is associated with high quality and high standard made-to-measure garments by highly skilled artisans. The Haute Couture name and brand remains protected by copyright of the French Federation Chambre Syndicale de la Couture Parisienne (CSCP) and retained within the Parisian region.

¹⁰ Models are a mock-up of a garment made out of everyday and straightforward weave cotton or linen fabric.

¹¹ Reference slips came with information on how to reproduce the garments (Lipovetsky 1994).

de la Couture Parisienne (CSCP)¹² (Leppens 2000). The CSCP was established to protect Haute Couture designers' work and to regulate the manufacturing industry. The CSCP held tight control over the how designs were brought, produced and sold, and had strict terms that manufacturers were required to abide by when purchasing models and licensing designs (English 2013; Leppens 2000).

Initially, the CSSP included both Prêt-à-Porter¹³ and Haute Couture, but in 1910 a split was made that allowed Prêt-à-Porter to increase its competitiveness by focusing on standardisation, and Haute Couture focused on luxury, know-how and creativity (Grumbach 1993, p. 24; Leppens 2000; Lipovetsky 1994).

In the 1940s, the CSCP introduced more rigorous controls to create a new subdivision of Haute Couture: the Office Professionnel des Industries et Métiers d'Arts et de Creation (Leppens 2000). In this category, couture houses were judged on their creativity and quality. Under the classification, members were required to do the following:

1. Design made-to-order for private clients with one or more fittings.
2. Present their 'collections' at least twice a year in Paris.
3. Showcase 35 new and original designs of day and eveningwear.
4. Must employ at least 20 full-time technical people in at least one atelier¹⁴ or workshop.

Until the 1940s, fashion houses did not present collections or have fixed dates for showings. It was only in response to pressure from international buyers that showings aligned at fairly fixed times. The purpose of these showings was to regulate, not accelerate fashion (Leppens 2000; Lipovetsky 1994, p. 58), although this standardisation and production cycle signalled the transformation of the fashion system to the regular cycles of seasonal presentations that dominated the fashion industry until the end of the 20th century (Lipovetsky 1994). Seasonal collections are shown in Paris twice a year, with each house presenting a summer collection in January and a winter collection in July. The CSPH enforced strict rules on the reproduction and publicity of the collections and, initially,

¹² Translates as the professional organisation of high fashion, Paris (Leppens 2000).

¹³ The French term Prêt-à-Porter translates as ready-to-wear. These garments are machine made and have standardised sizes.

¹⁴ Atelier is French for a workshop in which an artist or designer works.

photography and sketching were forbidden (Kawamura 2005, p. 85; Mendes & De la Haye 1999, p. 139).

Throughout the 20th century, fashion shows became a significant part of selling and distributing fashion garments. The fashion show was a tool for retailing as it became the way of attracting new buyers, media attention and promoting fashion to retailers who stocked it (Kawamura 2005; Leppens 2000). Every season, designers would invite buyers and members of the press to review and photograph the pieces. The media would promote the designs through publications. Initially this was via fashion plates, which in turn became the fashion magazines and fashion journals we have today, and onto retailers to sell the designs to their customers. The media also played an essential part in selling the merchandise, as the fashion presented in fashion magazines would entice the consumer to purchase the designs to wear (Kawamura 2005).

2.2.2 *Prêt-à-Porter / ready-to-wear*

It was not until the middle of the 20th century that the fashion system was fully democratised, when French couturier Yves Saint Laurent opened the first ready-to-wear store in 1965 and launched his Prêt-à-Porter collection line, Rive Gauche. Until then, manufacturers still relied on purchasing models from Haute Couture to be produced in watered down versions for the ready-to-wear market (Crane 1994; Lipovetsky 1994).

Yves Saint Laurent's collection aimed at bringing fashion to the masses; this was in direct competition to Haute Couture. Saint Laurent not only produced ready-to-wear clothing for the mainstream market, but he also looked towards the growing youth culture for inspiration in his designs. The post-World War II babies (baby boomers) were coming of age in a society of high economic growth and affluence, which created a new independent and rebellious youth not seen before. They profoundly influenced Saint Laurent on what was happening on the street, creating a new language in which he took high-end couture elements and mixed them with everyday wear. This new vocabulary adapted to any circumstance for any consumer (Baudot 1999). Street influence had not been seen before the fashion system was decentralised, whereas fashion had previously come from the central source of Paris, filtered down, and then out. The trickle-down theory had

reversed, and the flow of fashion now trickled up¹⁵ from mainstream culture to influence design (Polhemus 1994; Crane 1999).

The expansion of the fashion industry and mass production would not have been possible without developments in technology (Kawamura 2005), such as the sewing machine and the shift from home production of garments to large-scale manufacturers. Large-scale production led to lower costs and increased productivity, which, in turn, resulted in increased consumption. Improvements in transportation and distribution made it possible to supply copies of the newest fashions rapidly and at a reasonable cost to anywhere in the world (Kawamura 2005).

For the next 30 years until the end of the 20th century, the diffusion of fashion was evident, and the centralised fashion system from Paris was no longer. Style permeated all areas of society, spreading internationally from London to North America and now originated from multiple sources to many specific and fragmented segments of society, with both trickle-down and trickle-up models of fashion evident in modern society (Crane 1994).

The mid to late 20th century saw a slow decline of Haute Couture, until it was entirely subsumed by Prêt-à-Porter (Lehnet 1999). The more affordable price point of ready-to-wear led to increased demand for fashion goods. The production of machine-made clothing expanded, the use of advertising to sell products increased and advanced technologies led to the growth of capitalist business methods (English 2007).

The development of street fashion, the emergence of subcultures, anti-fashion, punk, disposable fashion, postmodern, fashion as art, and deconstruction fashion, all rendered the high price of Haute Couture obsolete and out of touch, and it became a mere branding and marketing¹⁶ tool (Mendes 2010; Polhemus 1994). Fashion that was once defined as dressing up; now the concept of dressing down had emerged (Crane 1994; English 2007, p. 113).

¹⁵ Trickle-up theory refers to when the lower classes or masses adopt a style and innovation, which is then taken up by designers and on to the upper social level (Field 1970 cited in Crane 1999; Polhemus 1994).

¹⁶ During the 1980s, there were only 700 couture industry purchasing clients. Most garments often cost more than most peoples annual salaries, so profits were minimal and many Haute Couture companies ran at a loss. However, they generated enormous exposure and increased prestige, which enabled them to license their goods to manufacturers that created huge profits (Mendes, 2010)

While fashion had decentralised, the systemised cycle of developing and producing fashion garments from the 1940s to the early 1990s followed the same path. The traditional process for ready-to-wear was based around a fixed two-season calendar in a six to 12-month cycle, (see figure 2.1) and is made up of three critical areas:

1. Design commences by researching and developing a concept for each season's collection. From here, fabrics and trims are purchased, and many styles are designed to form a collection.
2. Production is two-phased. Phase one is the development of a sample collection, which is produced in a single size (sample size) and sold through wholesale agents or by collection showings, such as catwalk shows. Buyers and retailers review the collection and place orders for individual boutique retailers or larger department stores. Phase two is the development of garment production. Styles are produced according to wholesale buyer orders and demands. When manufacturing is complete, the products shipped.
3. Retail. Once manufacture is completed, garment deliveries are made to each retail store. Deliveries are made as early as three months before the required season and sold over a three to six-month period.

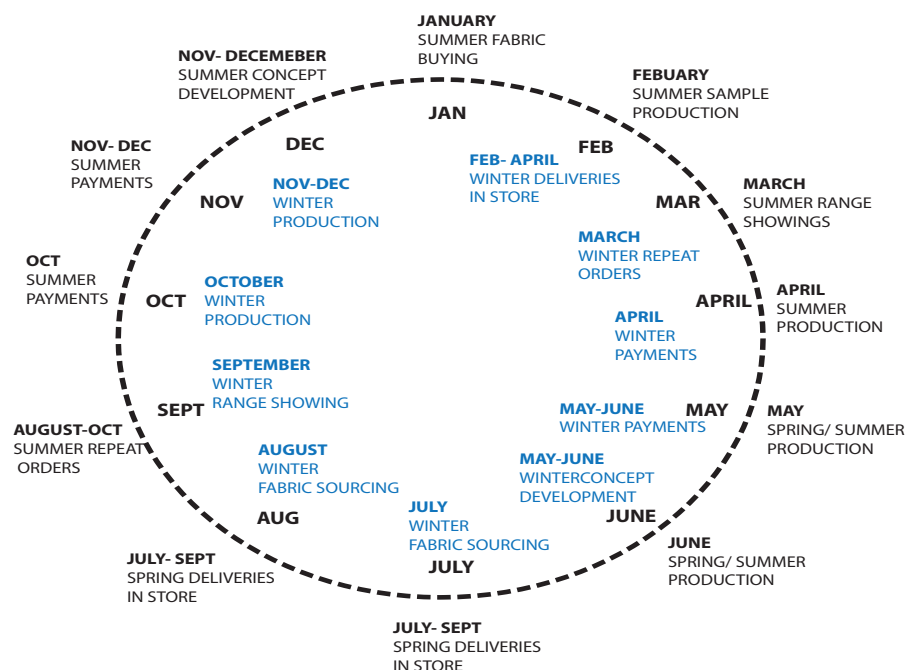


Figure 2.1. Example of a two-season design cycle for the Southern hemisphere in Australia, developed by the researcher to show the critical areas of design, production and retail of fashion products for ready-to-wear market.

2.2.3 The rise of fast fashion

By the late 1980s, there was another shift in the fashion cycle as the constant evolution of styles and trends moved into a competitive, profit-driven arena. The press, department stores and distribution networks disseminated fashion trends shown in the Haute Couture and ready-to-wear collection shows to a mass audience, and their power was considerable (English 2007, p. 278). Fashion became faster and cheaper, and disposable fashion emerged from the postmodern movement (Leitch 1996).¹⁷ Fads, or short-lived fashion, challenged the concept of permanence, classic styling and practicality (English 2007, p. 93). This trend-based rather than seasonal-based clothing encouraged consumers to make purchases more frequently and spend more money, leading to manufacturers seeking new, alternative production methods to keep up with the demand.

Adapted from the car manufacturing industry, just-in-time manufacturing¹⁸ is a quick response method designed to reduce flow times in production between suppliers and consumers (Anderson 2013). The critical philosophy of the just-in-time model is waste elimination in all areas of production,—such as, overproduction, waiting times, transportation, processing and inventory—and consequently increase revenue and profit. The fashion industry adopted the method to improve its production cycle and better meet the supply demands of consumers, which has become what is known today as fast fashion. Companies that produce fashion through quick response methods are considered fast fashion retailers. A fast fashion system combines quick response production with enhanced product design capabilities, to both design 'hot' products that capture the latest design and consumer trends and exploit minimal production lead times to match supply with demand (Cachon & Swinney 2011). Fast fashion retailers increased the two-season design schedule to six to 12 cycles per year, and release mini or capsule collections.¹⁹ In a

¹⁷ The postmodern movement is associated with the 1970s, 1980s and 1990, when consumption spurned out of control, encircled by money, wealth and power associated with the distinctive dynamics of a late capitalist political economy (Leitch 1996).

¹⁸ This also known as cycle time management, time-based competition and quick-response manufacturing (Anderson 2013).

¹⁹ The mini or capsule collection is a modern term that I use to describe a smaller collection of limited styles. Typically, this would not be higher than six to eight different styles at one time.

continuous production and selling cycle (Anson 2010), they could keep up with demand, increase sales, reduce costs and offer more new products to encourage consumers to visit their retail stores more regularly (Cachon & Swinney 2011).

The rapid rise of fast fashion retailers in the 21st century has been remarkable. Fashion brand Zara is an example of a fast fashion company. The scope of its design and production output is substantial. The international brand is based in Spain, has over 1,900 stores in 87 countries, and it produces over 11,000 different designs per year, with 40% of those produced in-house.²⁰ Its yearly sales are more than 13.8 billion euros, of which almost 2 billion is profit (Hansen 2012). Its parent company and production facility, Inditex, produces over 840 million garments per year for Zara and its other brands (Hansen 2012). Despite the large number of garments, the vertical retailer's²¹ manufacturing and production facilities remain incredibly flexible (Sull & Turconi 2008) and it rotates the retail stock at least twice a week.

Zara's approach, along with other fast fashion companies, has transformed the traditional two-seasonal calendar to consecutive monthly deliveries. This new cycle combines a two-tiered approach. The first is the quick adaptation and implementation of trends; this relies not on original ideas, but the imitation of fashion designs from Haute Couture and ready-to-wear collection shows that reduces design development to days. The second tier is the collection of sales data through their retail stores. Customer style and merchandise preferences are recorded daily and then forwarded to head offices. The product development design team develop new designs based on those preferences and in-store sales (Hansen 2012). The styles are produced in-house in their factories, and by limiting the variety of garment styles, the production cycle can be narrowed to only eight days, thereby leaving two to three weeks of selling in-store.

²⁰ In-house is an industry term to describe when a company pays all costs associated with creating its products.

²¹ A vertical retailer is a company that designs, produces and sells its product through its retail stores.

ZARA “Objectives”

- Continuous design, production and distribution

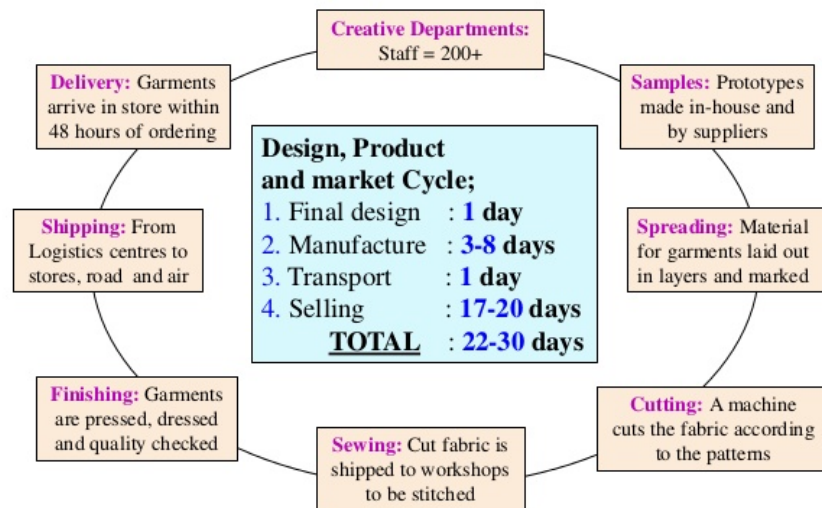


Figure 2.2. Zara's design, production and retail schedule shows the breakdown of its design and production over a monthly program. Note that this differs significantly from a ready-to-wear cycle. There is no design development, the production lead-time is short, and the longest time allocated is for selling/retailing the product (Dinh 2014).

2.3 The state of fashion

The fast fashion movement not only disrupted the traditional fashion cycle, it transformed the way consumers respond to and buy fashion. The rapid turnover of a product creates a sense of urgency to either purchase designs or miss out on the style (Shephard & Pookulangara 2013). This quick response of the dissemination of fashion trends ensures consumers are now seen in the latest fashion trends from high-end brands only weeks after first seen in the catwalk shows (Crane 1994). Ready-to-wear designers are now faced with the same fate that facilitated the demise of the Haute Couture industry; the copying of their creative ideas, and the lower price point for a replica product.²²

²² In fashion it is difficult to prove and prosecute copyright on garment designs due to the universality of clothing. It is widely accepted in the industry, particularly in fast fashion, that a design variation of only 10% does not breach intellectual property ownership. Copyright is not the same for textile and art design where it is easier to prove original work. For further clarification on Australian intellectual property law, see the fashion rules website, available at <http://www.wipo.int/edocs/lexdocs/laws/en/au/au332en.pdf>.

2.3.1 The speed of fashion on creativity

As a fast fashion company is able to produce clothes very quickly, ready-to-wear designers are increasingly under pressure to shorten their lead times, to compete with the fast fashion chains (Shephard & Pookulangara 2013). In the Paris collection showings, it is not uncommon to see catwalk collections of five different shows from one designer. High-end ready-to-wear fashion companies such as Chanel and the House of Dior now produce up to six collections per year (FHCM n.d).²³ In the race to compete, the issues that surrounds high-end fashion brands and its designers are in creativity and product development. Haute Couture and ready-to-wear fashion designers work to develop creative and original designs, which take time. They have extensive collections and therefore longer lead times. In the traditional two-seasonal cycle, three to six months are allocated for design development and production to facilitate design incubation and the higher volume of garments produced for each collection.

Fashion designers are seen to be creative people. They interact with their environment and need different skills. They need a full field of contextual references and use everyday observations and real life issues to develop creative design solutions for individuals to wear and express themselves (Jerrard & Bell 2008). Designers develop by learning social and political theories, design concepts, problem-solving, cognitive functioning, and intellectual thought processes and reasoning that requires multifaceted and multi-level thinking. Past research shows that fashion designers need to interact with their environment so they can think about what to do with the acquired knowledge (Jerrard & Bell 2008). Philosopher Donald Schon, in his book *The reflective practitioner* (1983), advocates the use of reflective processes to obtain new knowledge about the practice, to gain new insight from the familiar and further understanding of routine, describing creativity as a reflective process that unfolds by the act and art of doing.

In each stage of design and garment development, the fashion designer utilises reflective practice (Jerrard & Bell 2008). A designer reflects on a hand-drawn sketch to generate design functionality and aesthetics that are translated into technical drawings. Technical specifications include construction details such as seams, openings and allowances, before

²³ For example Chanel presented 6 catwalk collection shows in Paris 2017 including Pre Fall 2018; Spring 2018 ready to wear; Fall 2017 Couture; Resort 2018; Fall 2017 Ready to wear and Spring 2017 Couture collections see vogue.com/fashion/shows/design/chanel to review collections.

moving onto the toiling stage. Once the development of a toile is completed,²⁴ either through draping or flat patternmaking, the design is assessed again by the designer and their team, including a patternmaker, sample maker and design assistant. The team review how the garment sits on a live body, usually called a fit model, for design, proportion, style and fit. Each feature is analysed and discussed (Stecker 2009), and again, adjustments are made and amended on the sample with fabrics allocated. A second sample is constructed with the changes to develop another example. This process may be repeated multiple times before an adequate design and fit are made to produce the final sample garment. Once the final garment has been completed and approved by the designer and team, amended specifications would be transferred back to the final technical drawing for pre-production. The final design is graded into multiple sizes ready for production and then sale. At every stage, a designer is expected to combine practice, knowledge, skill, learning and reflection on the process to achieve the desired outcome.

In recent years there has been increased media discussion and growing concern within the sector on the emotional cost on fashion designers to come up with new, innovative concepts and products (Horyn 2015; Mower 2016; Rissanen 2016). The pressure on a designer is not only to produce new and exciting clothing, but to ensure they translate into sales on the retail floor. Increasingly, designers are held accountable for the financial success of a collection. If their designs do not sell, they may be discarded for another designer (Mower 2016). High-end contemporary fashion designers Alexander McQueen,²⁵ Raf Simons and Nicolas Ghesquiere have all publicly spoken about the pressure fast fashion has placed on designers' ability to be creative, and the push to develop new ideas more and more frequently.

In a 2015 interview, the House of Dior's creative director at the time, Raf Simons, discussed the changing speed of fashion with journalist Cathy Horyn.²⁶ He explained: 'The Tokyo collection was completed in three weeks, actually, everything is done in three weeks, a maximum of five. When I think back with my first (Haute) Couture show for

²⁴ A toile is a three-dimensional pattern in a material fabric; the toile is usually made of pure canvas or calico and used for garments and design prototyping. It helps designers test out design ideas and analyse and assess the design for proportion, shape, style and fit of a product before finalising it for production and sale.

²⁵ Alexander McQueen founded his label in 1992. He was also the chief designer of Louis Vuitton-owned Givenchy from 1996 to 2001.

²⁶ Cathy Horyn is a journalist for The New York Times and is a widely recognised fashion critic who writes extensively on the fashion, clothing and textile sector. Previously, Horyn was a fashion writer for the Washington Post, Vanity Fair, and The Detroit News, and has published several books on fashion.

Dior, in July 2012, I was concerned because we only had eight weeks' (Horyn 2015). In response to the shortened development time, Simmons created two design teams so that the design process was a streamlined system of machine-like precision, where each minute was allocated. When asked about the creative process Simmons explains, 'when you do six shows a year, there's not enough time for the whole process. Technically, yes—the people who make the samples, do the stitching, and they can do it. But you have no incubation time for ideas, and incubation time is crucial. When you try an idea, you look at it and think, Hmm, let's put it away for a week and think about it later' (Horyn 2015). Each team works on alternative collections of Haute Couture and ready-to-wear that includes up to eight designers, along with the atelier's 75 specialist seamstresses and tailors in an effort to ensure the design process is efficient—very quick and productive, but leaves little room for change or second opinions. Does this work? Simmons goes on to say, 'Technically speaking, it works. Does it work for me emotionally? No, because I'm not the kind of person who likes to do things so fast. I think if I had more time, I would reject more things, and bring other ideas or concepts in' (Horyn 2015). Within several weeks of this interview Simmons resigned from the House of Dior, primarily due to the pressure of the fast fashion cycle on high-end fashion brands.

2.3.2 The cost of speed

We are using technology to create faster, bigger, more, cheaper, disposable products. As the speed of developing fashion and fashion products continues to grow, labour and material resources will not be able to keep up with demand. As more retailers attempt to shorten their production cycle, the fast fashion trend will eventually hit a glass ceiling (Fletcher 2010; Hansen 2012). In this fast and low cost industrialised production model, it is now cheaper to produce a new product than repair an old one (Black 2008; Chapman 2005; Fletcher 2008). Consumers are encouraged to purchase goods before the old one has reached its use-by date and apparel is one of the few commodities that have dropped in price in the last 10 years (Fletcher 2007, 2008; Kunz & Garner 2011). The development of fast fashion's quick response, low cost systems mean that consumers now expect to be able to buy more with less. Technological innovations have accelerated the process of designing and selling clothes so that clothes now lack value, creativity and craftsmanship, and are designed for obsolescence. In the name of growth, current industry practices have placed pressure on fashion designers to design for price and profit rather than quality,

craft or innovation. In an increasingly mobile society and workforce, individuals lack a sense of belonging and attachment to a place, things or culture. Consumers have little or no connection to the clothing they wear and are now completely removed from the manufacture of the products purchased, which are quickly discarded and replaced when the latest style becomes available.

2.3.3 Fashion and economic growth

The fashion industry is an important industry that holds a dominant global position economically and culturally in today's society (Black 2008). In terms of economic value, in 2016 the industry was estimated to be worth 2.4 trillion US dollars, making it the seventh-largest economy in the world (Amed et al. 2016).

Fast fashion's growth-based principles dominate the fashion and textile sectors. This set of business principles, in the creed of market economics, are focused on achieving continual economic growth, and this growth is essential to maintain the stability of the economy the broader fashion industry has evolved to incorporate (Fletcher 2014, p.18). In the fashion sector, the logic of growth is well established as the basis of power and prosperity, and for fashion brands this success is measured in term of retail sales as a percentage growth each year (Fletcher 2014). As success in today's fashion and textile sector is driven by high-profit margins, increased sales and profits, the more units produced and sold, the more known and commercially viable the fashion designer or fashion brand becomes.

In recent decades many researchers, academics and theorists have questioned the benefits of a growth-based economic model (Jackson 2009; Sandal 2012; Thorpe 2014; Victor 2008). The primary issue that surrounds continuous economic growth is that it relies on consumption. The higher the consumption, the more growth it generates, and research shows that 60–70% of growth comes directly from consumer demand (Organisation for Economic Co-operation and Development [OECD] 2009; Thorpe 2014) and the cost of this growth-based model is substantial. It is also expensive for the environment, in material terms, as every unit of growth uses up resources and creates waste (Thorpe 2014). There is startling evidence of a waste problem—too much waste, using up limited resources with the over-consumption of products, particularly fashion and clothing that is discarded and ends up in landfill. Depleting our natural resources and creating material waste that ends up in landfill, contributes to the environmental

degradation of the planet's finite resources, and this is unsustainable. Significant change is required within and outside the sector, and focus on different economic models and systems are needed. These issues are further examined in Chapter 3.

2.4 Fashion and the internet

The introduction of the internet in the last quarter of the 21st century has revolutionised our society and modern living. It has transformed almost every aspect of our daily lives. Communication, social participation, access to information, tools and their use towards democracy, are some of its most important assets (Anderson 2012; Mason 2015). Information technology challenges the capitalist economy's law of supply and demand, as access to information is now abundant (Mason 2015). The internet serves as a tool where information is freely accessed, and it is a technology everyone can gain admittance to (not only reserved for the rich and powerful). The capital required to produce and process information is now available to the masses, which makes it difficult to control. Online access to information is changing world economics and reshaping the politics of intellectual property ownership. A transition to the digital economy through the internet will see capital cease to be a primary driver in modern economics and has the power to transform and redefine familiar notions of work, production and value (Mason 2015). Further advances in automation and information sharing—both of which cause production costs to approach zero—will end an economy solely based on markets and private ownership (Anderson 2012; Mason 2015).

The fashion of the 21st century differs from the fashion of any other time, as the access to information technology has transformed textiles and clothing production. Fashion trends that used to take years to travel from one part of the world to another are transmitted instantly by the internet, with industry success often relying on the ability to interpret and reproduce those trends as quickly as possible, and market and sell them to consumers (Stecker 2009). The internet has shifted the paradigm of information—rather than experts creating static content for audiences to read, everyday people come together to work collaboratively (Holroyd 2014; Gauntlett 2011; Niessen 2011). The internet has shifted media culture from being passive, such as through television broadcasting, to active and participatory, as demonstrated with YouTube and Wikipedia (Gauntlett 2011;

Holroyd 2014; Niessen 2011). On the internet, an individual can self-publish, have an opinion, get support on those opinions from others, and make changes in a local community or globally (Ziv 2013). Social media platforms such as *Twitter*, *Facebook* and *Instagram* are all examples of the power of the individual and the greater community it creates. The consumer is now political and part of a collective that can bring about changes in the way and type of products produced. From boycotting products that are bad for the environment or outing a company's poor working conditions for the products they provide, to promoting and buying goods that are ethical and sustainable such as fair trade products and organic food and clothing (Ziv 2013).

While advances in industrial technology have shortened the supply chain and made it quicker to produce clothing, the internet has brought the consumer closer to the designer and created a dialogue between the two, so the designer is no longer reliant on the supply chain to communicate its message to the consumer.

Designers are currently placed in a unique and potentially powerful position, one they have not been in for decades. Fashion designers should be prepared for a new cycle that will give them control over what, how and where they produce and deliver their products (Ziv 2013). The scenario introduces new concepts of economy, collaboration, product and value, and highlights the importance of design as part of a new agenda.

The internet has become one of the most significant technological developments of modern society. The internet has democratised information, the individual and its broader community, and we are seeing innovators and visionaries exploring a new way to create, work, live and do business. These innovations, processes and methodologies are further detailed in Chapters 3 and 4, and in Volume 2.

2.4.1 New digital lifestyles

Within a growing digital economy, our culture, lifestyles and visions of work are changing; the internet provides the possibility to no longer working nine to five in an office environment. Information technology has made the flow of communications constant, business global and friendships virtual. The internet brings people closer together regardless of where they live geographically, and it becomes more about showing the skills and abilities of an individual. This challenges organisations to be less formal, more flexible

and adaptable (Anderson 2012). Work environments are no longer location-based, allowing flexibility and movement between cities, states and countries indeterminately. The internet sets a path to new industrial organisational models and structure, one built around smaller, loosely joined and interconnected models, working in a non-hierarchical and decentralised way. Soon companies will be smaller, virtual and informal, with most participants not employees but contractors and freelancers (Anderson 2012, p. 151). The last decade has seen a shift in company employment and size is now an increasing liability. In fact, the American Fortune 500 has lost 13 million employees within the United States, and the fastest growing employer is the individual (Edelman Intelligence 2017)

Current statistical research shows more than 30% of the western world now work as freelancers. Over the last several years, the growth of freelance work compared to the traditional workforce in America is threefold, and it is predicted that by 2035 more than 50% of the workforce will be freelancing (Edelman Intelligence 2017; Upwork Global 2017). In 2016, the total earnings from freelance work in America was 1.4 trillion dollars. The primary drivers of freelance work are freedom and flexibility, and more than 65% of freelancers believe automation and artificial intelligence is transforming the workforce industry. This is already prevalent in niche areas of the economy, seen with driverless cars, and as the workforce continues to become more automated it will free up leisure time and the need for full-time work (Mason 2014).

This changing work practice through freelancing allows individuals more freedom to move around and be less bound to places and things. A more transient lifestyle, no longer confined to traditional work offices, sees a change in dress practices to a relaxed style of dressing that suits a more casual environment. Fundamental shifts in ownership are taking place and individuals are now less likely to buy and hold material things. In rejection of the high consumptive society, niche and grass roots social movements such as minimalism and living with less have become increasingly popular and mainstream. In which, experiences are valued more than ownership and these weigh less than purchased products. Owning fewer items allows an individual to remain flexible and agile with their environmental impact and consumer waste lessened. In a nomadic lifestyle ownership becomes a liability.

Having a more mobile lifestyle changes the relationships with fashion and how and what individuals wear. Fashion will become clothing again, functional and multipurpose, more adaptable and responsive to its environment (Fletcher 2010; Edelkoort 2015). Backpacks

are designed to contain everything from complete wardrobes to personal offices and are transported with the individual as they move freely around. In this new nomadic lifestyle, these changes entail not only traditional roles and relationships but also the blurring of activities and the redefining personal and public spaces.

2.5 Summary

Technology has spearheaded the development of the fashion system. These developments have affected all areas of the fashion supply chain. This chapter has examined vital transition points that have facilitated its progress to the current system we have now. The impact of technology demonstrates that while the innovation has created growth, this has not always been a positive result for the industry, society or the environment. It is evident that the role of the fashion designer and the industry in which they operates is changing. This chapter has provided a background of both the challenges and opportunities the industry faces. It contextualises the historical evolution of the industry's current situation, so it may move forward to a relevant and sustainable future, armed with the knowledge and foundation that enable possibilities and concepts into how fashion practice can be applied, to ensure the fashion and clothing industry's relevance and livelihood in the near future. The issues discussed in this chapter and conclusions reached have influenced the studio practice and artefacts as shown in the *Future Archeology 6.0* exhibition.

Chapter 3: Re-Designing Fashion for Tomorrow's Wardrobe

3.1 Chapter introduction

This chapter examines sustainable design in fashion from a system and practitioner's perspective. It explores the designer's role within a sustainable system and encourages new ideas and details on its application to practice. The chapter surveys innovative designers challenging the current fashion cycle with alternative practice methods that do not align with the traditional fashion system in a growth-based economic model. The chapter explores how technology can be integrated into designers' practice to assist the designer in creativity, design and sustainability, and applied to fashion to promote a more human, scaled down and collective action.

3.2 Sustainable design

As examined in Chapter 2 through the industrialised economy has seen the mechanisation of goods and services over the past 100 years dominate modern society. It saw the exponential growth and commercialisation of products and services contributing to the highly consumptive, growth-based, profit-driven, capitalist economy we have today. This modern society is driven by linear production and design methods—one that operates from the extraction of raw materials, to production, on to distribution, then consumption and finally disposal (Leonard 2017). Consumers now have products that come ready-made, in a vast array of shapes, colours, sizes, patterns and materials (von Busch 2015). The industrialised production model has become so fast and low cost that it is now cheaper to produce a new product than repair an old one; new goods are purchased before old ones reach their use-by date (Black 2008; Chapman 2005; Fletcher 2008). We are buying goods at an alarming rate and now, on average, this linear production model accounts for 90% of materials becoming waste within three months

(ENDS Report 2007; Fletcher 2008; Leonard 2007). Our high rate of over-consumption is unsustainable, and research shows we are now using more of the world's resources than the planet can produce (Chapman 2005, Leonard 2007). In global terms, predictions show that by 2050 we will triple annual resource extraction and consumption (Fletcher 2014; UNEP 2011, p. xv). To maintain climate stability, a substantial reduction in resources and economic activities are necessary to live in a sustainable resource management system (Fletcher 2014).

Environmentalists are calling for a significant rethink in our practices and reinforcing that change is necessary (Chapman 2005; Fletcher 2008; Fry 2009). This involves transforming our linear production system to one encompassing sustainability, equity, renewable energy, clean chemistry, closed-loop production and local living economies (Anderson 2012; Braungart & McDonough 2009; Chapman 2005; Fry 2009; Leonard 2007). However, to do this we must re-contextualise the perception and importance of economic growth to business success, wealth and society's well-being, as the principal need, to one that values and considers the environment by safeguarding and conserving our natural resources (Leonard 2007; Schumacher 1999; Thorpe 2014).

In recent research, the benefits of this growth-based model are being questioned, and there is a growing community groundswell resistance to growth-based economies. This economic model is expensive, uses up natural resources and contributes to a significant amount of material waste (Jackson 2009; Sandal 2012; Thorpe 2014; Victor 2008). The questions raised include whether further economic growth adds to a society's richness, or whether it undermines social wealth and environmental quality, and ultimately makes us poorer (Daly 1992, p. 100; Fletcher 2010; Schumacher 1999, p. 63).

According to theories of economic growth presented by Schumacher (1999) in *Small is beautiful: Economics as if people mattered* the perception that growth creates a wealthy society, to buy and accumulate material things and contributes to prosperous, happy individuals and their communities. Modern economics is measured on the standard of living, the amount of consumption and assumes the man that consumes more is 'better off' than the man who consume less (Schumacher 1999, p. 38) However, he argues that this is far from the reality, and the pathological need for growth-based on wealth is, in fact, detrimental to all other human needs and consideration (Schumacher 1999, p. 63). Many quantitative studies conducted on the relationship between income and happiness over

the last several decades show, that material wealth; the goal of growth, adds little to happiness (Victor 2008, p. 125; Fletcher 2010; Schumacher 1999; Spratt & Murphy 2009).

3.3 Fashion consumption

As noted in Chapter 2, research has shown the fashion and textile sector and the products it produces are one of the most significant contributors to over-consumption and wastage (Chapman 2005; Fletcher 2008). Addressing the high level of clothing consumption is a complex issue, and it is unreasonable to suggest consumption is restricted to an isolated event, such as only during the process of purchasing. It is a more complicated process, which includes the individuals' external and internal values, meanings of identity and the consumer engagement with the products they purchase (Baudrillard 1998; Chapman 2005; Fletcher 2008).

To bring about sustainable changes in consumption, we need to have a better understanding of the function of clothes. As discussed in the previous chapter, fashion and clothing are two different concepts and entities (Fletcher 2008). While the apparent purpose of clothing is material—that is, to protect our modesty and keep us warm—this function is supplemented and often eclipsed for fashion pieces. Fashion is consumed for its symbolic functions rather than their material ones: on the premise of identity, where we signal who and what we are to others; and in attempts to negotiate our place in a social structure (Bourdieu 1987; Fletcher 2014, p. 144; Veblen 1899). The products we consume become extensions of ourselves, and our consumption becomes entangled in the non-verbal and visual communication wrapped around an individual's set of beliefs, values and identity (Bourdieu 1987; Fletcher 2014). Thus, fashion's visual code can be read for clues on an individual's style, taste, sexuality, wealth and background (Barthes 1957, 1993; Simmel 1957). Sociologist Robert Bocock (1993) argues this identity, where we show ourselves through fashion, is perpetual and comes from the desire for something we do not have. It is the quest for the 'lack', which can never truly be satisfied; therefore, the more we consume, the more we desire. Ultimately, this desire to accumulate beyond the individual's basic need inhibits the sense of self and identity, and displaces real human needs such as relatedness, creativity, brotherliness, individualism and reason (Bocock 1993; Fromm 1955/1990, p. 131).

3.4 Sustainable fashion

Interest in fashion sustainability has been growing over the last decade, with new research detailing alarming evidence of the social and human cost of the fashion industry's practices with cheap, affordable, trend-based clothing (Black 2008; Chapman 2005; Fletcher 2014). This cost is highlighted by the example of the 2015 Rana Plaza garment factory collapse in Bangladesh,²⁷ where over 1,100 people died and 2,500 people were injured. The victims were mostly young women who were producing clothing for big global clothing brands. The collapse exposed the poor working conditions, unsafe buildings, poor wages, excessive working hours and unrealistic demands on production turn-around times for western style clothing. However, of the pressing issues with sustainability, the one that dominates the discussion is the environment and the cost of our production and consumption practices on natural resources (Entwistle 2016, p. 29). High water usage, high consumption, waste in landfill, transportation cost and energy use are all environmental costs of producing clothes in today's society.

Yet all is not lost, as internally and externally around the fashion and textile sector there are signs of a fundamental shift- taking place. As Black observes in *Eco-chic: the fashion paradox* (2008), this new sensibility in fashion recognises that the conspicuous consumption of fast fashion must slow down, which means change is needed in all areas of the fashion business model—from the supply chain, raw materials, designers and manufacturers to retailers and their associated industries (Black 2008, p. 18).

Concurrently, alongside the fashion sector, there is a broader societal shift away from the current economy. On the edges we are starting to see a multitude of social movements and grassroots projects that show a change in consciousness and reawakening to the fact that we are not separate from the earth as a living system (Macy n.d.; Thackara 2016).

This transformation of the global system interprets the beginning of a new, radically different economic system, where production is mainly collaborative and social and value is based on the quality of social interactions rather than quantity of productive time

²⁷ The Rana Plaza collapse is one of the biggest catastrophes in the fashion and textile sector and has spurred many documentaries on fast fashion and activist campaigns against the fashion industry's practices, including 'the true cost' and 'fashionrevolution.org' that encourages the industry to be more transparent and accountable.

(Arvidsson 2013; Schumacher 1999; Thackara 2016). These goods and services no longer respond to the dictates of the market and managerial hierarchy. Businesses such as *Homeexchange.com*, *couchsurfing.com*, *blablacar.com* and *Gumtree.com* are all examples of markets based on collaborative consumption and production of the sharing economy and peer-to-peer market. While ethical economics is still small and accounts for a minor market share, it has been quietly growing in numbers and is moving into mainstream society (Macy n.d.; Mason 2015; Thackera 2016).

3.4.1 *Slow fashion*

With recent industry recognition that the principles of fast fashions' profit and growth are not sustainable, new social movements have formed; ones that focus on minimising consumption and the creation of a more humane and durable society (Black 2012; Fletcher 2010). In the clothing and textile sector, this movement is slow fashion, inspired by the Italian slow food movement of the 1980s, a rejection of the fast food phenomenon of homogenised food (Clark 2008; Fletcher 2010). Once out on the fringes, this collective movement is transitioning into the fashion industry's mainstream. Consumers who are more aware and concerned about environmental and social issues are a driving factor for fashion brands to invest in corporate social responsibility (Fletcher 2010). In recent years the slow concept has grown to encompass not only fashion but social lifestyles as well. Simple living, minimalism and frugality are associated with the broader cultural movement of slower lifestyles and a return to more authentic values and principles.

The purpose of slow fashion is to examine the supply chain from a more holistic perspective that begins by planning with the product life cycle in mind, making socially and economically responsible sourcing decisions, and contributing towards consumer education to increase awareness and responsibility regarding the product lifecycle after purchase (Clark 2008; Fletcher 2010).

The key to building on slow fashion progress is not just modelling the traditional production techniques in a new way under the same growth model—that is, by continuing the short lead times and maintaining the high turnover of new styles regularly—but by completely rethinking the values that underpin its context and concepts. This means developing a new foundation based on different economics and a different set of values contributing towards a more fulfilling, rational and saner worldview (Fletcher

2010; Schumacher 1999). What is necessary for sustainable fashion progress is to slow down the turnover of producing garments, and long-term thinking on solutions that encompass a social and ecological richness and satisfaction (Fletcher 2014). For example, selecting only materials that support fair trade and cause little harm to the environment; producing clothes with an emphasis on quality and craftsmanship; utilising experienced labour and the local community; buying local and supporting ethical practices and fair wages in a transparent and open society; focusing on education and consumer knowledge on care and consumption practices; and supporting and training retail employees on responsible practices for relationship and community building and longevity (Pookulangara & Shepard 2013).

Reformation, an American fashion brand founded in 2009, is an example of a company that aims to adopt ethical and sustainable principles throughout the supply chain. The company designs and manufactures all its products using sustainable methods and materials. It strives for best practice and transparency of its environmental impact, and invests in green infrastructure to minimise waste, water and energy footprint, working towards zero waste in all business methods. Reformation does not retail its products through traditional bricks and mortar stores; rather, they distribute online with an e-commerce website. Packaging is plastic free, and the company has developed a RefScale principle. The scale shown on the website, is divided into sections where consumers can view the impact of each garment on the environment, carbon dioxide, water usage and wastage, compared back to the current industry standards. RefScale tracks the environmental footprint by adding up the pounds of carbon dioxide emitted, gallons of water used, and pounds of waste generated. Reformation then calculates how its products help reduce these impacts compared with most clothes bought in America (Reformation 2018). In the name of transparency, this information is shared on every product on the website and exact details on the environmental impact is given. Consumers' awareness of total cost enables them to make empowered choices and create better solutions when it comes to making and purchasing clothes in fashion.

3.4.2 Zero waste design

Zero waste fashion is a method utilised at the beginning of the designing process, where waste is designed out of the products manufactured and all the garment patterns fit together like a jigsaw puzzle (Black 2012, p. 248; Rissenan 2013). A designer uses both

design and patternmaking skills to ensure all fabric used is in the garment design. Zero waste design is a contemporary term that highlights inefficiencies in the current fashion supply chain. Evidence shows that, on average, garments are produced with 15–20% of fabric wasted through the cutting and making process (Rissanen 2013, p. 4). Zero waste design aligns with the slow fashion movement. Rather than buy less, better quality clothing, it takes a more considered approach to developing garments by encouraging designers to take a pro-active, best practice approach that designs out wastage to zero. The concept of zero waste has existed for centuries with methods applied throughout history. The Japanese kimono is an example of zero waste design. The kimono is cut using a series of rectangles in a variety of sizes, allowing for sleeves, body and neckline, which are sewn together to construct the garment where all the fabric is utilised (Rissanen 2013). No fabric is wasted during the cutting process and any surplus fabric is pleated into the front neck. The kimono is hand-sewn and entirely unpicked for washing, thus returning it to its original two-dimensional form (Rissanen & McQuillan 2016, p. 12).

In my professional practice, I have explored zero waste methodology as a designer to create several zero waste designs for commercial fashion garments. One particular garment style was the 'tomorrow series' for Kyotap in 2007 (see Figure 3.1). The series included three different garment styles: a top, a skirt, and a dress. Each style encompassed the entire width of the fabric. The only fabric cutting required was for the length of the garment. The selvage of the fabric is joined together to create a centre back seam and an invisible zipper inserted for closure. Knife pleating was applied in an asymmetric pattern around the design to gain fit to the body. Rather than hiding the stitching of the pleating, this is shown on the main side of the fabric and used as a decorative garment feature. The finalised pattern consisted of one rectangular piece with pattern annotations for pleating placement. A cotton tape was used for the shoulder strap, and as a face finishing on the bustline of the top and dress, and along the waistline for the skirt. Similar to the Japanese kimono, these garments can be unstitched and returned to the fabric's original state, thus making the styles designed for disassembly. Once unpicked, and the fabric returned to its original state it can be redesigned into a new style when the old one is no longer 'in fashion' or worn out.



Figure 3.1. The 'tomorrow series' included the tomorrow top, the tomorrow dress and the tomorrow skirt. The series was developed for Kyotap's Spring/Summer Collection 07/08. The designed pieces were produced in a variety of fabrications for several seasonal collections, including 08/09 until 2010.

Another example of zero waste design innovation is a way of production in fashion knitwear called whole garment knitting. Whole garment knitting proposes to be a real opportunity in the reduction of garment and fabric waste for the fashion cycle and supply chain. Whole garment knitting is knitting that utilises specialised industrialised machinery to knit garments in their final three-dimensional form, thereby eliminating fabric seams and waste. Typically, a knitted garment consists of separate parts that are sewn together. Whole garment knitwear is produced in one three-dimensional piece, thus eliminating waste and post-production labour, and reducing manufacturing time and cost. This manufacturing process allows small producers to compete with large-scale manufacturers by having the ability to provide on demand, customised pieces at a similar price to mass-produced garments. The sustainable challenge for these innovations is using the technology to enhance creativity, rather than creating more garments, more quickly, without wastage, to take a holistic approach to the technology by adopting a circular methodology to the design and post-consumer waste cycle.

3.4.3 Circular design

Circular design considers the entire life cycle of the fashion and textile product. Designing for a closed-loop attempts to address the question of what happens when products expire and the care into their disposal considered. Can it be recycled? Is it biodegradable? Can it be remade into something else? Circular design provides more opportunity for users to engage with a product's utility, extending the potential satisfaction with existing

pieces so additional ones are no longer required or purchased (Chapman 2005, p. 50; Fletcher 2016). Circular fashion removes the waste cycle by utilising the materials back into the production circle to be remanufactured into new products. The notion of closed-loop recycling was extended and popularised by the 2002 book *Cradle to cradle* by McDonough and Braungart.

3.4.4 *DIY and re-use*

The overall aim of waste management strategies is to preserve the products and materials in their highest value state for as long as possible. This strategy encompasses re-use of goods, repair and reconditioning of goods, and recycling of raw materials (Fletcher 2008, p. 100).

The do-it-yourself (DIY) process of making clothes is not a new idea and has been around for centuries, but a resurgence of DIY has been taking effect over the last decade. This subculture of DIY in recent years signifies a broader growing trend towards a different lifestyle to our current highly consumptive society and return to a slower, more authentic life in tune with nature (Cramer 2011; Fletcher 2014; von Busch 2014). Just a few decades ago, the objectives of home sewing in the west were primarily those of economy or fit. Today, however, as with many other DIY activities, the objective has changed to instead address individual accomplishment, creativity, self-confidence, independence, self-reliance, development of skills and, not least, lifestyle (von Busch 2014). DIY and re-use sees a return in craft-based skills movement and the movement's transition into the commercial domain. Over the last decade, more high-end fashion designers are moving into this space, which once sat on the fringes of craft culture and niche markets. An example of this is high-end fashion designers Victor & Rolf who, over the last several seasons, have self-imposed restrictions on working with minimal fabrics and recycled materials. They believe these design restrictions encourage their creativity and challenge them to think outside the box. For their Haute Couture 2018 spring collection the limitation was to use only one material; a duchess satin. Surface treatments were used, such as fabric manipulation and weaving techniques; digital printing with laser cutting and hand embellishments were used to explore design outcomes. For the Haute Couture 2017 spring collection, the duo deconstructed old party dresses and reconfigured them into new designs—an approach reflective of wabi-sabi, the Japanese

garment mending technique of boro, and Japanese pottery repair with gold, kintsugi, used in a conscious design that acknowledges the beauty of imperfection.

Belgium conceptual fashion designer Martin Margiela has been exploring the use of found materials throughout his career. Margiela challenges and, at times, pokes fun at fashion. His methodology is based around up-cycling, reconstruction and reconfiguring garment design. These up-cycled, waste and craft-based garments are found in collections dating back to the late 1980s and his first catwalk collection. In 1990, Margiela dedicated an official workshop space in the Paris head office 'the artisanal'.²⁸ Developing the artisanal line, the workshop team for its first collection brought together flea market garments and other second-hand finds to disassemble and remake into one-of-a-kind pieces. The collection was the first time a fashion designer offered new pieces constructed entirely out of reclaimed and up-cycled clothing (Margiela 2018). Margiela continues to produce the artisanal collections with this methodology under the Maison Margiela Haute Couture fashion house.

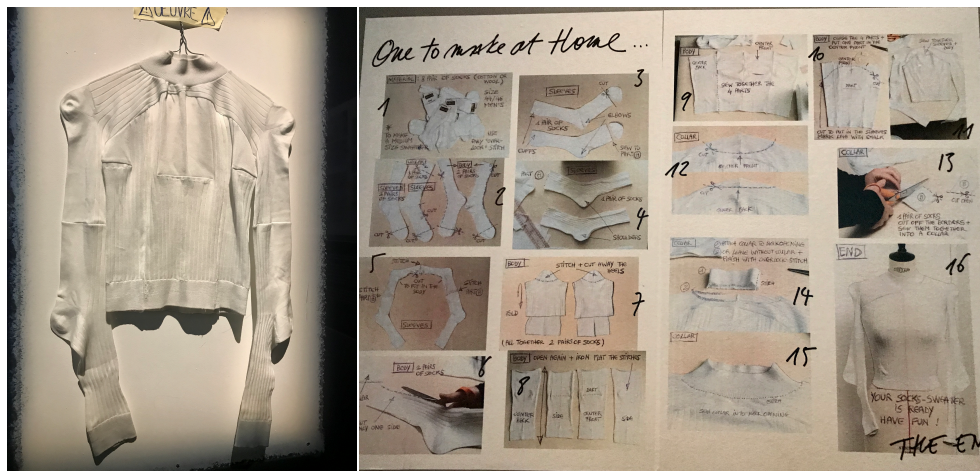


Figure 3.2. Margiela / Galliera 1989-2009 exhibition in Paris, 2018. The sock pullover was part of the artisanal workshop collection. The top is constructed from eight pairs of socks carefully positioned and thought out so that the heels would correspond to the rounded parts of the torso, bust, elbow and shoulders. Along with the top, were a set of DIY instructions and images that documented the process of constructing the garment so the wearer could potentially make it themselves.

²⁸ The definition of artisanal, for me, is to focus on small-scale, with an emphasis on craftsmanship, employing craft-based skills as well as manual techniques in the design and production processes.

3.4.5 *User centred design*

In *Emotionally durable design* (2005), Jonathon Chapman proposes designers to radically rethink the design practices of the goods we produce. Rather than design to increase the lifespan of a garment through durability and sustainability of materials, he calls for designing and developing products that connect emotionally with users on a deeper level, and consider human needs to create emotionally durable designs—products that engage the wearer and make them feel good. Designers must begin to understand empathy, meaning and the individual needs of consumers if they are to bring about changes in consumption in our material world. 'Products that represent the individual, and that they will keep; cultivate true materialism that fosters a deep appreciation and respect for the material quality of things, in order to develop an understanding of their value in ways that go beyond their usefulness' (Chapman 2005, p. 50). Enlightened by this knowledge we act with care (Fletcher 2016, p. 140). Research shows that if a person is connected to a product, they keep it longer (Fletcher 2014, p. 194). Although learning to trigger enduring meaning may encourage users to keep their clothes for longer and possibly increase the likelihood of a second life, research studies show that alone, emotionally durable design does not necessarily impact individual consumption patterns (Fletcher 2014, p.198). Chapman says 'Designers can elicit an emotional response when designing products; however, they cannot craft an experience for the consumer' (Chapman 2005; Fletcher 2014, p.199). Encouraging a more expanded view of durability through 'usership' is one way of building a better connection for consumers and their products. Durability as a function and emphasising that durability in fashion is user-based rather than product-based as ultimately, consumer patterns of use dictate a product's durability (Fletcher 2014, p.201).

3.4.6 *Collaborative and participatory design*

Collaborative design attempts to bring the user back into the domain of the product, material knowledge and the art of craft and making. As identified in Chapter 2, until the late 19th century, the production of clothing was a highly participatory process. While bespoke tailoring and dressmaking services gave way to standardised manufacture in the early 20th century, the 21st century is witnessing a return to a more personalised approach, enabled by interactive technologies that facilitate and intimate dialogue between fashion producers and consumers (Cramer 2011; Fletcher 2014; von Busch

2014). Whether mass customisation or bespoke design, participatory design models have the potential to foster stronger emotional bonds between consumers and fashion garments by engaging them in the design and making processes (Cramer 2011, p. 3). Research suggests unique and personalised clothing is likely to have meaning for the consumer and result in them keeping it for longer, thereby increasing its lifespan and keeping it out of landfill, and possibly postponing the purchase of a replacement product (Cramer 2011, p. 3). Participatory design is built on the idea that the users of the product are entitled to have a voice in determining how it is designed (Fletcher 2014, p. 229). Designers still play a strategic role in the development of products, but they no longer hold exclusive control over function and use, and the wearer is no longer a passive consumer but a co-creator and partner (Fletcher 2008, p.192). The movement of collaborative design is gaining in momentum, and many designers and brands are joining forces with their costumers to create products together. Fashion brands creating products that involve consumer's is a way to develop a stronger, more authentic relationship between the two. *POAM.com* (Print All Over Me) is an online-based business that invites DIYers, creatives and designers to collaborate with them to produce commercial fashion garments and accessories. The starting point is series of basic product types in a range of universal garment shapes for ready-to-wear and streetwear markets. The styles range from t-shirts, pants, hoodies, dresses and accessory designs with a plain base material fabric set for each garment. Consumers get the opportunity to either purchase a print from a collaborating artist/designer or develop their own design. The user is taken through a series of steps, starting by selecting the garment style, and choosing a textile print by purchasing or uploading a digital file into the garment interface. The user then determines how that print is placed and positioned on the style. The garment is then manufactured as a one-off design for the user. Designers and other creatives can collaborate on the platform several ways, either by offering their original prints for users to purchase (thereby receiving a commission on each piece sold) or integrating the works with their website by paying a membership fee.

DIYcouture is a company addressing collaborative design by establishing an online repository of basic sewing techniques to supplement the instructions they provide for the patterns available for purchase from their site. *DIYcouture* does not manufacture a seasonal ready-to-wear collection; instead, they present the collection online as a range of pattern books for purchase. The website describes this approach as: 'Helping people to

produce garments that are precious, rather than disposable, this is the antithesis of fast-fashion (DIYcouture n.d.).

Inthefolds.com is another online-based fashion business focused on the DIY movement that does not produce collections. Designer Emily Hundt engages with her community through the website with online tutorials on sewing and patternmaking techniques. Emily collaborates with the ethical fashion magazine *Peppermint* to provide several downloadable patterns free of charge. Other designs can be purchased through the website for a minimal cost, encouraging the user to gain skills and knowledge, demystify the process of making clothes, and thereby ultimately create designed, customised garments at home.

3.4.7 *Anti-fashion*

Adapting clothing for function rather than fashion has the potential to provide a more sustainable approach. Trend forecaster Lidewij Edelkoort's²⁹ manifesto *Anti-fashion* (2015) predicts the looming end of the fashion system as we know it and posits that it will have a renewed focus on clothing and new ideas on how to handle clothes. She anticipates a return to the specialised skills of Haute Couture and a comeback of the selling of authorised copies of couture (Edelkoort 2015, p. 8). Ready to wear designers are caught up in the endless cycle of sketching, producing, styling, showings on the runway, pleasing buyers, gifting celebrities, infinite marketing and promotional activities, and praying for it all to pay off. This is then repeated over and over, every season (Viv 2013, p. 94). Using technology and textile innovation can reposition the designer's focus to invest their creativity in solving our everyday problems and finding ways to innovate beyond the choice of fabric, shape and colour (Viv 2013, p. 93; Edelkoort 2015). If designers and fashion brands switch their focus to single products rather than collections, to produce garments that are multi-functional or can easily change appearance, they can address multiple climate and users needs. Shape shifting or multi-functional garments entail changing the shape or silhouette of a garment and require a more challenging and thoughtful approach from the designer. For garment design, shape needs to consider the physical parameters and boundaries that define the space in which the wearer moves, and

²⁹ Lidewij Edelkoort is an internationally recognised leading trend forecaster in the design industry. She writes extensively on the fashion, colour, interiors, and lifestyles. She publishes industry trend journals through her company Trend Union including Bloom, talking textiles, View on Colour and In view

requires a different approach in construction and patternmaking techniques and more open and engaged response from the wearer (Fletcher 2008). This approach encourages the wearer to play around and alter the shape and style to suit their needs. Fashion designer Hussein Chalayan developed a conceptual range of pieces for his autumn/winter 2000 ready-to-wear collection based on nomadic living (see Figure 3.3). The concept explored the idea of a travelling wardrobe, Chalayan, was inspired by the news about people fleeing their houses in a rush during the war and also of his own experiences as a Turkish Cypriot living abroad in the UK (Chalayan et, al. 2005). Within the presentation was a living room setting, which transformed into the final five pieces in the collection. The living room is designed to be packed-up and transported with the user. The grey fabric cover on the chairs are unclipped and removed to become garments, using cleverly placed fastening and reversible fabric to show flashes of colour. After removal of the material, the chair structures are folded up to form a suitcase to be carried away. The centrepiece table transforms into a wooden skirt. Chalayan's premise was that clothing and furniture are multi-functional, interchangeable and able to be transported to any desired location or worn on the body (Chalayan et, al. 2005).

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Figure 3.3. The travelling wardrobe by Hussein Chalayan is comprised of four dresses and a skirt. The chair fabric coverings unclip and convert to the dresses through a series of stud fastenings. The table becomes a skirt by circular cutting of the wood and clips onto a top.

In my professional practice, I designed and produced a commercial transformable garment series for Kyotap in 2007. The pieces, *Apollo 13*, included a top and a dress (see Figure 3.4). Each style was constructed as an oversized rectangle with the only construction seam at the centre front. The garment fabrication is a mid-weight jersey for comfort and wearability. Three fabric ties are sewn into the centre front seam that wraps around the body, allowing the wearer to manipulate the design and alter the silhouette of the garment in an array of combinations. The style encourages the wearer to engage with the piece and explore different shape options. The variation of the silhouettes is unlimited and

not pre-determined, configured and altered for many different body shapes and sizes. Ultimately, the garment is designed for disassembly, as the seams can be unstitched with the fabric returned to its original form and remade into a new style.



Figure 3.4. Apollo 13 dress the images show the garment ties in various positions on the body. The series developed for Kyotap, Autumn/Winter Collection 07 and produced in a variety of fabrications for several seasonal collections including 2009 until 2011.

3.5 Summary

This chapter highlighted the changes and progress towards a more sustainable future for the fashion and textile sector. Looking beyond the growth based economic model is as the only important factor of business success. The research shows examples of designing to eliminate waste, and creating viable, sustainable business models that are good for the environment, the economy and contribute to the well-being of its people. Fashion and textile operators need to aim toward an open and transparent practice and work towards stopping the vicious cycle of buy, discard, buy new. Through engagement of the consumer and designer in a more collaborative and open design approach, there is potential to influence sustainable change in consumers (Cramer 2011; Fletcher 2008). Reconnecting the consumer with the process of making can empower the individual, creating confidence, active participation and engagement, and build rewarding relationships with clothes that better meet individual needs. This offers potential to realign fashion and clothing from a disposable and wasteful position, to one that is circular, transparent and focused on the responsibility of creating products that deliver better, more rewarding garments to consumers.

Chapter 4: The Digital World

4.1 Chapter introduction

Unlike other industries, the fashion and textile sector has been a late adopter of digital technology and slow to integrate new digital technologies into industry practice. The use of 2D CAD software programs such as Adobe Creative Suite, including Illustrator, Photoshop and InDesign has increased in the design process over the last two decades. Recently, there has been a growing interest in digital technology with more published research on technology within the fashion industry; however, fashion technology is a field that is under-researched and underrepresented academically (Black 2007, p. 299). This chapter surveys new developments in fashion through technology and examines its application within the fashion cycle and how these new technologies have influenced and changed the designer's process of developing garments. Moreover, it represents ways in which technology and its computer interface can provide a new design environment, to create and establish a modern aesthetic and culture that respects craftsmanship, authorship and location. The chapter surveys innovations that are disrupting the supply chain and changing the future practice of clothing and fashion moving forward.

4.2 Integrating technology into the design process

While many designers see technology as a tool rather than part of the creative development process, there are a few designers who challenge that thinking. Alexander McQueen, Hussein Chalayan and Issey Miyake are all designers who develop and utilise technology as part of their creative practice and design exploration. Designer Issey Miyake has used innovative methods throughout his 50-year career designing clothing, and he continues to be at the forefront of innovation and technology in fashion design.

In the late 1980s, Miyake redirected his design focus on clothing instead of fashion, as a way to develop a more democratic style for a wider audience. He revolutionised garment design with the introduction of his '*pleats please*' collection with polyester—a high tech

fabric at the time. The process challenged traditional western garment construction by developing pieces two and a half times greater than their proper size, that were then heat pleated to reduce the garment back down. The garments are constructed with the material folded, ironed and sewn so the straight lines remain in place, and then they are heat pressed into permanent pleats. The final pieces are flat, two-dimensional objects that emerge from the press and shift back to three-dimensional form, and exaggerated silhouettes when on the body (Miyake 1999). In 1998, along with textile technician Dai Fujiwara, Miyake developed his 'A-POC' (*a piece of cloth*) clothing line (see Figure 4.1), in which the clothing is made with a single piece of fabric intended to limit waste, fashion excess and provide a minimalist template for design, the A-POC collection involved garments made on a computerised knitting machine that has different styles embedded into a roll of fabric (Black 2008, p. 50). The device is pre-programmed to spin a continuous tube of cloth that repeats patterns of seams interwoven into the material with different shapes that resemble dresses, shirts, socks and other fashion-related styles. The user then is able to cut out garments without sewing a seam. Each item is designed slightly oversized, and allows users to customise their garments to their own desired style with scissors; thus, the wearer becomes the designer of each outfit.



Figure 4.1. Issey Miyake's A-POC series. The knitted fabric starts as a flat form. The images show the steps to complete the garment style through a procession of cuts on the material.

In 2010 Miyake launched 'I/32.5', a project inspired by the work of computer scientist Jun Mitani who developed a program, the Mitani CG application that creates a three-dimensional paper model with a smooth, curved surface out of a single flat sheet of paper. Miyake's research team at the Reality Lab in Tokyo embarked upon a project to digitally design three-dimensional shapes, using the CG application to make 3D shapes from

paper, and then study the ways by which these can be returned into folded-flat forms. The team incorporated a series of fold lines and cut lines not included in the original CG structures to return them to flat, planar shapes. The Lab's collective collaboration was critical to the process, as they look at each piece of clothing from the standpoint of its aesthetics and comfort. From here, the team conceived an algorithm that created unique 3D geometric shapes that folded into 2D forms, and then heat pressed to become folded shirts, skirts, pants and one-piece dresses (Miyake 2012). The team then fine-tuned the final garments to body shape for comfort (see Figure 4.2). A unique synthesis of mathematics, clothes making and sustainability, the recurring collection is not scheduled by season, but instead revolves around the tenets of 'regeneration and re-creation' (Miyake n.d).



Figure 4.2. Issey Miyake I32.5 project shows the flat folded garment design and the right image shows the same style on the body (Miyake 2010).

4.2.1 Digital printing

The explosion of digital printing in the last 20 years has opened up the textile design process for fashion designers, allowing more original and creative fabric print designs to be developed at a much lower cost, with more sustainable practices. With the recent focus on sustainability and ecological practices of the fashion industry, the rise and popularity of digital printing can be attributed to its lower cost and environmental impact than the

industrial textile printing methods of screen printing (Fletcher 2008, 2014). The industrial garment dyeing industry is one of the biggest polluters of local streams and rivers through the dumping of untreated wastewater, with 20% of global water pollution attributed to textile dyeing and finishing (Kant 2012, p.23). Digital printing and new methods such as air dyeing require 95% less water and 85% less energy than conventional fabric dyeing and require no post-treatment or finishing in the transfer of a print onto fabric (Fletcher 2008, Dhanabalan et, al. 2015). Other methods of digital printing such as sublimation and heat transfer also offer reduced environmental impact, with less than 30% energy and 95% water consumption than industrial textile dyeing (Dhanabalan et, al. 2015). Digital printing allows the designer to create designs on a computer using 2D CAD software programs such as Adobe Photoshop and Illustrator. Fashion designers have been quick to exploit the creative possibilities of digital printing, as the process to produce one-of-a-kind and engineered innovative designs that would be time-consuming, costly and difficult to do using traditional printing methods, is no longer required. The benefits of digital printing are extensive, and include higher colour vibrancy; the ability to print in a vast spectrum of colours; reduced setup costs; no repeats, customisation or personalisation of design produced in short and quick runs, with no colour limits; short turn-around times for sampling; and print on demand capabilities with zero by-production of waste dyes (Dhanabalan et, al 2015; Fletcher 2008, 2016).

4.2.2 Virtual prototyping

Historically, developing fashion garments and clothing is a labour intensive process. Fashion is one of the few remaining craft-based industries that rely on manual labour for manufacturing across its broad spectrum of levels, from couture to mass production (Black 2012, p. 139). The 'hands-on' approach to the creative development is embedded in the fashion designer's learned craft, skills and industry culture. The continuing impact of digital technologies on traditional skills and processes raises complex issues for the fashion industry, while also creating new opportunities (Black 2007, p. 299). CAD's enhanced and shortened design process is underdeveloped, and currently, the use of CAD in the industry is not typically a fully integrated process. Digital software programs sit alongside one another rather than serve as a fully integrated and cross-pollinated process.

To date, there is limited published research on the integration of digital technologies and the designer's creative practice, but previous studies suggest CAD impedes the creative

development of the fashion designer and the industry. A UK survey conducted by Jerrard and Bell (2008) examining fashion students using digital patternmaking software, demonstrates that fashion designers need to interact with their environment, have a relationship with the materials they are handling and respond as real objects in real time so they can think through what to do. The fine motor skills and mental processes such as working with fabrics, textiles, drawing and sketching by hand are vastly different from the skills designers use when developing designs on a computer (Jerrard & Bell 2008).

Removing perceptions about CAD and creativity could potentially eliminate the fashion industry's resistance to implementing new digital technologies in creative practice. Improvements such as adopting a more responsive user interface rather than speed and accuracy of performance could potentially aid the process and be more complementary to the individual's intellectual domain (Jerrard & Bell 2008). Since that research, there have been newer and more enhanced technological developments. Given the limited scholarly and published research into CAD and the fashion designers' creative process, further rigorous analysis would need to be undertaken of CAD in fashion practice to uncover future potentials of technology and creativity in fashion.

Virtual prototyping can remove the labour intensive practice of developing garments by shortening the trial and error process and enabling a more effective visualisation of the relationship between the body and the clothing. Virtual prototyping is exciting as the process of jumping back and forth from 2D to 3D development can now be completed virtually, online, through the computer interface. The software allows the designer to complete the workflow of designing through the replication of garment development on screen, in real time. This not only reduces product development time but offers a more sustainable approach, with less use and wastage of materials going through the prototyping stages, minimising samples and toiles by analysis on screen with simulated, virtual fabrics. 3D prototyping has the potential to create a more streamlined, integrated process of working between three-dimensional and two-dimensional methods on screen simultaneously. Moreover, this design, as with the software, can be modular. Different people can work on it in different places, at different speeds, with relative autonomy.

Over recent years new developments in virtual prototyping, 2D CAD/CAM pattern and fashion design software has proliferated. Design programs such as *Optitex*, *Clo3d*, and

Marvelous Designer are examples of this technology allowing the user to create 3D virtual clothing within a computer interface.

Clo3d is an example of a 3D fashion prototyping program (see Figure 4.3). The software specialises in true-to-life garment simulation. Developed by tech company CLO Virtual Fashion Inc, the software allows users to import and sew 2D CAD patterns on a customised, virtual fit model (avatar). The 3D program enables designers to develop designs as well as material modifications in real time, potentially minimising product development from weeks to less than two hours. The interface allows the user to create designs and pattern simultaneously, working in both 3D and 2D spaces on the screen. 2D patterns can be imported into the program or developed from scratch within the interface. While onscreen, users can design and embed textiles and fabrics in the design, along with the ability to add or build trims and accessories. The garment fit is assessed for body pressure points using simulations on the avatar in the 3D space and amended without a real garment being produced. On screen review and style changes are made instantly, which eliminates the need for physical samples until the final sampling stage, saving time, cost and material wastage. The virtual designs can be viewed by everyone in the product development process, from design and production teams, end user, and sales in a digital format. The software package provides a range of body avatars, either with fixed dimensions or custom measurements, allowing one-off and made-to-measure garments to be easily and quickly created to specifications.

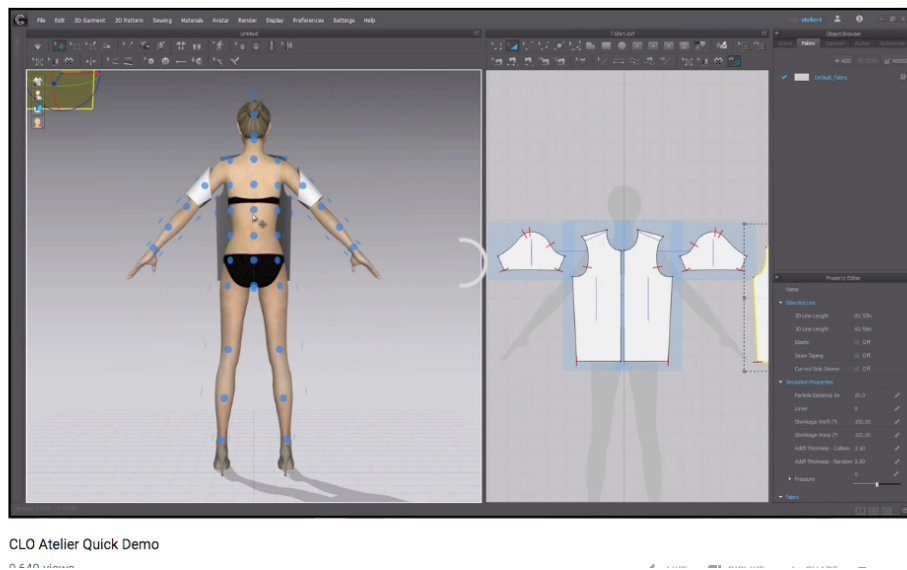


Figure 4.3. The Clo3D interface. This image shows the avatar simulation on the left screen. The right screen shows the 2-dimensional patterns. The user can alternate between the screens as designs are developed and tested in a seamless process, and reflect on the physical and design aspects during development until finalising the sample (Clo3D 2018).

4.2.3 Mass customisation

Mass production has been the entrenched paradigm since the Industrial Revolution over a century ago. However, the recent tipping point of fast fashion has led to a realignment of values and, in response to the impact on resources, has seen the rise of niche markets in a rejection of low cost, low quality, disposable clothing and goods (Black 2012). The economy of scale is losing its hold and its relevance, and customers are starting to demand product variety, requesting unique products tailored to individual tastes. Emerging out of new digital technologies is the new paradigm of mass customisation. Instead of treating customers merely as buyers, the designer needs to consider users as integrated participants in the product design and development cycle (Anderson 2012). In a customer-driven environment, with a more transparent society, everyday tasks are increasingly integrated with the internet and its convenience of 24/7 accessibility, production by the masses mobilises the invaluable resources that are possessed by all human beings (Anderson 2012; Mason, 2015). Similar to bespoke design, mass customisation allows a wearer to have input into the design of a garment by combining a range of components that can be selected from a pre-determined list (Cramer 2011, p. 440). The highly interactive nature of current digital technologies has enabled fashion

producers to personalise their interaction with individuals, which, along with the global reach the internet provides, allows niche operators and businesses to reach a mass audience (Cramer 2011, p. 439). While mass customisation is not a pure form of participatory design, as choices are still from a pre-determined list, it does provide opportunities for an individual to alter the configuration of a garment or product(s) to better suit their tastes, needs and lifestyle.

An example of mass customisation can be seen with *Unmade*, an innovative knitwear company based in the UK. *Unmade* using a standardised Stoll knitting machine, have developed specialised software and recreated the code to run the computers to create a web interface anyone can use. Through their online platform, customers can choose from preselected knit designs and garment shapes. Within the interface, the customer gets to explore the pattern on different placement areas on the garment, creating a unique and one-off customised design. Once a style is selected, the software allows the user to change fabric colour and patterns in a continuous flow-through of designs. These are then manufactured and conventionally shipped to the customer. This process radically changes the supply chain for developing knitwear, as it is far easier to produce knits in smaller batches manufactured on demand.

4.2.4 3D printing in fashion

New digital technologies in additive manufacturing such as 3D printing—that is, the process of making a three-dimensional solid object from a digital model—opens up whole new possibilities in designing and developing prototypes. 3D printing aligns with the significant shifts already emerging in consumer behaviour. Research predicts that 3D printing will become the new method of manufacturing for the future over the coming decades (Anderson 2012). The ability to produce products from small-scale, bespoke, custom-made manufacturing to large-scale manufacturing, makes 3D printing a viable option for both custom and mass production (Anderson 2012). This revolution has profound implications for designers, industry and individuals, as this technology becomes part of the everyday dialogue and part of daily life. As the cost of desktop 3D printers continues to come down, commercial manufacturing moves into consumer homes specialist technology is no longer required making affordable production at home a reality. The scope of possibilities is virtually limitless—if it can be digitally designed, it can be 3D

printed. Everything from sunglasses, jewellery, cups, vases, chairs, lights, even body parts and food can be conceptualised.

An example of this with North American based design studio *Nervous System*. Based in Somerville, Massachusetts the design studio works at the intersection of science, art and technology, offering innovative 3D printed products along with user centred and mass-customised design through their online platform. The design studio explores a new paradigm of product design and manufacture that combines scientific research, computer graphics, mathematics and digital fabrication to produce products. Through the website, and applets their products are offered as completed items or as customisable designs to users' individual specifications. The applets developed by the company that users can manipulate the products in a variety of different outcomes, that can then be 3D printed (Nervous System n.d.). A background in mathematics, biology and architecture provided the founding designers Jessica Rosenkrantz and Jesse Louis-Rosenberg the skills to develop sophisticated and unconventional geometrics to create processes that employ computer simulation to generate its products. Instead of designing a specific form, they craft a system that results in a myriad of distinct creations. They describe the systems as 'interactive, responding both to changes in particular variables and physical inputs without a definitive, final product' (Nervous System n.d.). Utilising rapid prototyping methods, techniques such as 3D printing, laser cutting, and computer numerical control routing, the unique customised pieces can be manufactured at the same cost as mass-produced ones. Their methodology is an iterative and experimental process, after brainstorming initial concepts, to write pattern algorithms, to further explore the ideas and ultimately create a finished product. The studio then releases the source code under a creative commons license to encourage others to work in this manner. Initially, the studio produced accessories but has since moved into creating fashion garments. In collaboration with Motorola in 2013, the design team were challenged to develop an app that could generate a customisable object printed on a 3D printer in under an hour. The project presented a considerable problem to the team as 3D printing is typically a slow process, with designs taking many hours to print, and the more complicated the model, the more time-consuming the process (Nervous System n.d.).

The process of 3D printing is an additive manufacture technique, and printing requires a digital file be converted into a code. This code, called G code gives the 3D printer a set of

instructions to lay down hundreds of successive layers of liquid, powder or sheet metal along an x, y and z-axis to build a three-dimensional model from a series of cross-sections.

Nervous System's solution was to develop a flat design that folded into another shape after printing. Using a hinge joint as a starting point, they adapted the self-supporting cone pin and socket joint. After perfecting the joint, they moved to a simple chain like pattern using triangles to create a fabric-like material. Importing the hinge into their applet allowed them to develop more substantial and complex shapes. The design team changed the way the pieces interlocked together, and instead of a fixed tessellation, the parametric curves can be manipulated to create various shapes that are tessellated on the fly, and the density of triangles can be adjusted to make the results more varied and freeform (see Figure 4.4). Changing the 3D printing process from extrusion to a powder-based method meant they could now design objects that were not self-supporting. Realising the broader implications of the design and technology, such as taking shape and transforming it into a flexible structure, they recognised they could create fabrics used for wearables like dresses.



Figure 4.4. Customised bracelet design I developed using the kinematic app, and printed on a PLA 3D printer.

For their latest project—a *kinematics*' dress (see Figure 4.5)—they created a four-dimensional system that 'generates compressed objects that unfold into their intended

shape after printing' (Nervous System n.d.), allowing complete garments processed through a 3D printer, without assembly. The system employs a smart folding strategy to compress Kinematics garments into a smaller form for efficient fabrication by folding the garments before printing them (Nervous System n.d.).

The *kinematics* dress is compressed by 85% from being folded in half, twice. The software mimics how one might physically fold a garment in real life as the garment goes through a series of collisions designed heuristically to reduce the overall size intuitively. The process is ground breaking in terms of clothing construction and manufacture, as it not only allows for garments to be constructed and manufactured in a single unit, the compression also allows pieces to be printed on smaller, cheaper, compact 3D printers, opening the possibility for the consumer to print their garments at home.

The dress was developed using 3D scanning technology and created from body scans with exact body measurements. The fabric like structure consists of 2,279 unique triangular panels, interconnected by 3,316 hinges. All sections are 3D printed in nylon using selective laser sintering. Each component is rigid, but the interconnected hinges behave as a continuous fabric that allows the dress to flow in response to body movement. The entire piece is customisable, from fit and style to flexibility and pattern, within the *Kinematics* applet developed and built with open sourced code technology. The website app shows an on screen virtual simulation of the way the dress will drape over the body, and as the design changes are made it uses an adaptive re-meshing technique to allow the user to design a pattern of modules in real time. While these complex structures would be difficult and time-consuming to create in traditional CAD modelling, the Kinematics app makes it accessible to anyone (Nervous System n.d.)

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Figure 4.5. The kinematic dress project shows the compressed form for 3D printing. The right image shows the dress in its printed form. The hinges allow for movement when on the body (Image: Nervous System 2015)

What expands the possibilities of 3D printing is that prototypes can be digital files rather than physical products. These files can be viewed or sold virtually to a customer and printed on demand to the user's specifications, thus reducing raw material waste of unwanted or ill-fitting garments. 3D printing offers a glimpse into the future and into a new way of designing and living—one that is free from ownership and the weight of holding onto physical things. Digital files require minimal or no physical space to carry, and they can be taken and carried on a Universal Serial Bus (USB) memory file or stored in a cloud-based system, eliminating the need for things and reducing the physical requirements needed to function on a day-to-day basis.

Web-based platforms such as *thingiverse.com* and *tinkercad.com* allow an end user to search for a range of 3D design files to print free of charge or be purchased at a nominal cost that can be produced at home or using third-party services. Innovative web-based companies such as *Shapeways.com* and *iMaterialize.com* provide online 3D printing services, putting this cutting-edge technology within easy reach for consumers. These companies assist everyone from designers, home DIY inventors and small business to upload digital files of designs and choose from a range of materials such as plastics, metals and even ceramics, to be printed and delivered to their door at an affordable price. There is also the option of selling designs through the service.

A conceptual project developed by designer Janne Kyttanen exemplifies the future potential of 3D printed products. Kyttanen designed 'lost luggage', a kit of clothes and accessories that can be 3D printed in one go from a simple computer file (see Figure 4.6). The lost luggage kit combines nine 3D print files including a bag, dress, pair of shoes and accessories to complete an entire outfit from head to toe. The file is designed so that a tourist can travel without luggage and 3D print the items off as needed, from any location or on arrival at their travel destination.

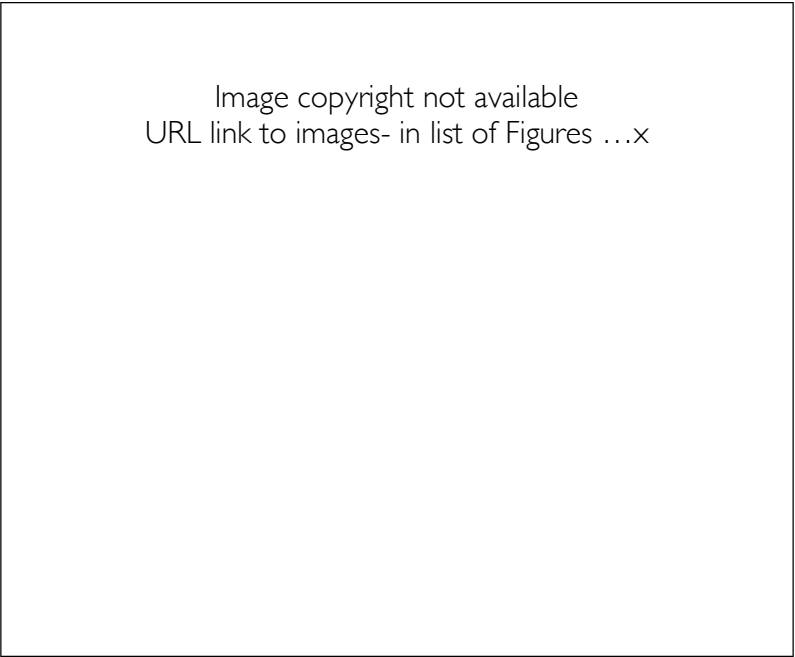


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Figure 4.6. Janne Kytanen's travelling wardrobe is entirely 3D printed, using PLA plastics (Kytanen 2017)

Currently, the materials supplied through 3D printing are primarily in plastics and metals, but there have been growing developments in the last several years. New materials, such as flexible and recycled plastic and biomaterials are further enhancing the potential for garments to be 3D printed in a commercial environment with more sustainable materials.

4.2.5 Open source maker spaces

Open source design has been made accessible through the internet (Fletcher 2008; Niessen et al 2011). The premise of open source is sharing skills and a collaborative approach to design. *YouTube*, *Wikihow* and blogs are an excellent example of this. Open source design shifts the one-way stream of information to offer a more inclusive, ecological and engaging model (Fletcher 2008). When participating in designing or making something, users gain new skills and knowledge they can apply to future projects and share with others (Cramer 2011, p. 443). As noted in Chapter 3, there is a current resurgence of craft, sewing and dressmaking communities, both online and in traditional community learning centres, all aimed at sharing knowledge. New social initiatives such as maker spaces and other garage workshops encourage collaborative, hands-on activities to turn abstract ideas into tangible objects for the everyday consumer (Anderson 2013). In fashion, open source moves beyond the world of commerce to one that is not controlled by the mega brands or retailers, but widely distributed by individuals, consumers, creators and designers (Fletcher 2008; Niessen et al 2011). These initiatives demonstrate a desire

to learn skills outside traditional educational institutions with a focus on participants gaining real, usable, practical skills. An example of this is found in Australia with 'The School'. Founded by interior designer Megan Morton,³⁰ 'The School' offers creative workshops led by industry specialists in a community atmosphere. The design workshops held in Melbourne and Sydney range from screen printing, natural dyeing techniques and extreme knitting to home décor styling. The classes are often sold out months in advance, demonstrating the demand for individuals interested in learning craft-based skills and methods.

4.2.6 Wearable technology

One way, designers can potentially create a deeper connection to the products consumers purchase and wear is by integrating technology into garments. Digital technology, as an application programming interface or wearable technology, has been taking shape in recent years with the growth of wearable tech in the accessories space starting to transition into the field of fashion. Computer science is transforming industries and igniting a renaissance in the creation of things and wearable tech, continues to grow and expand (Anderson 2012). Many fashion designers are increasingly interested in this field, teaming with engineers and scientists as they look for ways to bring more functionality in fashion garments (Pailes-Friedman 2016). By merging textiles with electronics and embedding nanotechnology into fabrics, 'smart textiles' that are conductive, or even computational, can be created. New nanotechnologies mean cloth can now be coated in particles to become a conductive fabric for use instead of wires, and thousands of tiny micro LEDs can be woven into such fabrics to create garments that can change pattern or colour instantly.

Fashion designer and educator Ying Gao questions assumptions about clothing by combining urban design, architecture and media design (Gao n.d.). She explores the construction of the garment, taking inspiration from transformations of the social and urban environment. For one project, Gao collaborated with robotic designer Simon Laroche to create two dresses, the *(no) where (now) here* dresses (see Figure 4.7).

³⁰ Megan Morton is a well-recognised Australian industry specialist. She is an interior designer and has published several commercial books on styling and home interiors. Her latest book, *It's beautiful here: homes that make your heart skip a beat*, was published by Thames & Hudson in 2017.

The dresses, which slowly move about as someone stares at them, are embedded with eye tracking technology. They respond to the observer's gaze by activating tiny motors to move parts of the dresses in mesmerising patterns. They are constructed from organza, photo-luminescent thread, PVDF and electronic devices. One (*no*) where dress is made from tendrils of photo-luminescent threads that dangle from a ruched fabric. On the other, glow in the dark threads form a base layer with fabric cut into ribbons loosely bunched over the top. When the lights are out, both the dresses become illuminated.



Figure 4.7. Ying Gao's (*no*) where (*now*) here dresses use photo-luminescent thread to create a glow in the dark garment. The eye tracking technology is activated by the spectator's gaze so the motors move the dresses to build a life on their own. (Image: Goa 2013).

4.2.7 Hybrid-craft

The modern industrial process often reduces the need for manual labour. As discussed in Chapters 2 and 3, this has seen traditional crafts disappearing and replaced by machines. Design has arrived at an evolutionary impasse, as the reduction in techniques that instil personal values result in artefacts that now seem less natural and less human (Zoren 2015).

In the last several years, researchers, designers and artists have explored approaches to merging digital making technologies with traditional craft ones. Makers who use digital design, fabrication or interaction technologies as part of their creative palette and blend them with other tools, techniques and making traditions are practitioners of hybrid-craft (Zoren 2015).

An example of this in contemporary fashion is Iris Van Herpen. Van Herpen studied fashion design at the Artez Institute of the Arts in Arnhem, Belgium. After an internship with Alexander McQueen, she founded her namesake label in 2007. In her Amsterdam atelier, Van Herpen experiments with new silhouettes by rejuvenating traditional crafts and applying innovative and unusual materials. In this way, Van Herpen produces designs that reinvent garment forms. The process of making, of doing research, of expanding the professional know-how of the fashion discipline is one of her primary goals. Within each collection, her methodology encompasses modern machine techniques, hand construction and finishing skills to fashion complex garment forms in a very high design standard (Pailes-Friedman 2016). In her Haute Couture collections, Van Herpen blends the handmade and high tech seamlessly to create unique and original work. The interplay between craftsmanship and rediscovered techniques, with new technologies and materials, demonstrate newly found innovation within fashion practice (Assouly 2013). Her mastering and experimentation of craft techniques and use of unusual materials such as metal, wood and plastic to form futuristic fashion garments is an exciting point of departure in the world of high tech.

4.3 Summary

This chapter documents a changing practice for fashion designers in the 21st century. Integrating technology plays an essential part of future directions, and by redirecting its focus on contributing to creative practice rather than speed is vital for a sustainable future. Technological sustainability also relies on keeping traditional crafts skills and knowledge alive to elicit a stronger, more rewarding process for designers' creative practice and engaging the consumer back into the process of design in a collaborative approach that ensures the longevity and relevance of the fashion and textile industries.

4.4 Conclusion

For a sector such as fashion, which sees the purchasing and wearing of garments as a critical way to construct identity, and freedom of the individual, re positioning the fashion and textile sectors ties to growth is a radical move of unknown potential. Moreover, it is

one that will form many of the central ideas for fashion sustainability over the next decade (Fletcher 2014).

Transitioning our fashion system and practice away from a growth-based model involves all actors in the system to play a part. Whether from a ground up or system down approach, it involves systemic changes from within and outside participants. If we transition the narrative of economic growth as a measure to one that is a societal well-being measure, e.g. genuine progress indicator or gross happiness index (Michaelson et al. 2009; Thorpe 2014) rather than the financial transaction of gross domestic product, we can shift fashion from a problem to a resource (Thorpe 2014). In a sustainable future, businesses are recommended to act more humanly, thoughtfully and considerate of the environment in which they operate and to include in its practice both consumers and society's needs, to act with a moral and ethical compass that leaves the environment in a better condition than they found it.

Designers need to be more engaged with the process of developing sound, creative products that are thoughtful, considerate of the global environmental system, with each individual garment lifestyle adding value to consumers' real physical and emotional needs, rather than producing more and more wasteful products.

As consumers, and as individuals, to rethink, the way we work, live and do business. An individual is a representation of its environment, and as individuals, to question the authority of leaders in business and government about the purpose of profits, the need for growth and for whom it benefits.

In the words of trend forecaster Li Edelkort (2014), 'individualism is over, and so people care much more about family, thus leading to a more compassionate society. 'It is all about a society which is, let's say, softer, more rounded, more textured'.

VOLUME 2

Studio Research

Chapter 5: Project Rationale

'The less foreseeable the future, the more we need to be mobile, flexible, ready to react, permanently prepared to change, super modern, more modern than the moderns of the heroic period.' –Gilles Lipovetsky 2005.

5.1 Chapter introduction

The first chapter of this document provides an overview of the design concept development and the project rationale. It will discuss the concept research, design methodology and limitations. It documents how the written research and investigations has informed the studio practice and project development.

Chapter 6 breaks down the components and details the systems and process for each of the artefacts. Several artefacts have overlapping processes, although each piece is individual and unique in its outcome. It will detail the methods, fabrication, texture, design process, silhouette, form and function. Various visual samples have been included to show the development of the patterns and artefacts to give the reader an understanding of the experimentation and direction involved. Chapter 7 presents the six inspirational artefact outcomes presented in the form of an exhibition and includes fabrications and texture explorations from Chapters 5 and 6.

5.2 Relationship of project work to the thesis

The theoretical research outlined in Volume 1 demonstrates the changing practice of the fashion designer. The research examined in Chapter 3 shows the necessity for designers to design garments and products that are sustainable, useful and have a minimal impact on the environment. The studio practice implements these sustainable practices and strategies into the creative development of garment design from the research examined. The studio work is experimental and explores the design process that develops

outcomes, which are digital patterns of the garment rather than explicitly completed garments. By engaging the user in the design and making process, the final patterns are collaborative and participatory, where the end user has input into the size, finishes, materiality and surface decoration of the garments. This process disrupts the ready-to-wear production cycle of producing multiple garments in multiple sizes to be sold in a retail store. Garments can now be produced on demand in a selected size by the end user. Like Issey Miyake's APOC collection discussed in Chapter 4, the wearer becomes the ultimate designer of the garment.

The digital and communication revolution examined throughout the thesis documents the changing design studio and identifies the flexibility and mobility provided by the use of new technologies, especially in terms of waste elimination. The freelancing movement shows that a physical working studio has become restricted and less important, with more designers working in non-traditional hybrid or 'on the run' workspaces. The freelance movement has seen computer interface increasingly utilised in the designing process. This was explored in my studio practice, seeing how far I could take the use of digital methods in the production of fashion clothing. To do this, I implemented the digital technologies examined in Chapter 4, including virtual prototyping and 3D modelling into the design exploration. Having a sound knowledge of the digital programs Illustrator and Photoshop assisted with working digitally, but the development of fashion garments required learning in a 3D interface and, for me, was an entirely new way of designing. Designing in three dimensions came naturally, with hand draping on a mannequin, and although transitioning those skills onto the computer interface took some time, I maintained consistency implementing them in the creative process. Initially, my expectation of the outcomes was to be entirely digital, but after researching the historical evolution of the fashion system and contemporary designers such as Martin Margiela, Iris Van Herpen and Victor & Rolf, I redirected my creative work to keep the handcraft skills of my practice in a blended form, rather than lose them entirely to a digital format. This direction was unexpected, but I am delighted I did not disregard those skills. I feel the outcomes are richer and more aligned with the new developments examined in Chapter 4 and current movements witnessed in the broader fashion system.

The artefact outcomes in Chapter 7, *Future Archaeology: 6.0* Exhibition, serve as inspirational pieces to the digital patterns. The outcomes blend both handcraft skills with

digital technologies in a hybrid system. Fabrications explored a range of up-cycled and post-consumer waste along with new materials to develop a range of high-tech and low-tech fabrications. Chapter 6 details the methodology employed.

5.3 Technical skills developed and applied

It was necessary to gain further knowledge in digital technologies to complete the studio experimental research. These included 3D modelling and virtual prototyping programs such as Rhino 3D, Form Z and Clo3d, which are used for garment design and pattern development; laser cutting services and techniques for textile adornment and surface design; and programming skills to develop the website. Handcraft skills, such as weaving and knitting, were also applied for textile and fabric manipulation in the development of project outcomes (see Chapter 7).

5.4 Concept research and design inspiration

The creative and experimental studio project is in direct response to the digital and communication revolution and its changing work practice, along with the environmental need to consume less using fewer resources in a new global sharing economy that has seen the rise of digital nomads, minimalist lifestyles and changes in dress behaviours.

In a transient society, life on the move requires individuals to be more adaptable and resilient, and to carry belongings with them. This includes more than just modern communication products such as mobile phones and computers; it also includes transportable and adaptable clothing, protection and living needs are required.

A nomadic lifestyle also requires knowledge of craft and making, and of how to build and repair things. It fosters cradle-to-cradle or circular design that sees all resources used able to be recycled back into new goods. Increased demand for mass customisation suggests fashion based on needs and relationships will become clothing again—functional, multipurpose and more adaptable and responsive to its environment (Fletcher 2008)—so individuals can own fewer things and reduce their carbon footprint, and their wardrobe.

In 2010, Canadian blogger Courtney Carver realised she simply had too many clothes. Carver decided to completely overhaul her wardrobe and keep 33 clothing items for a three-month season, including shoes, outerwear, clothing, accessories and jewellery. She

documented the process on a website she called '*Project 333*'—33 items of clothing for three months (Carver 2018). Carver called this her capsule wardrobe,³¹ and decided to place several further restrictions on her clothing purchases and not allow herself to shop or buy new clothes for three months unless she switched an item out with something else. If she bought a new shirt, she would have to get rid of an existing one. Since then, the capsule wardrobe lifestyle has spread across America and around the world in various forms and iterations (Carver 2018).

Another capsule example is the 10-piece wardrobe by Canadian blogger Ariana Schwarz who, while living in Paris, reduced her wardrobe to just 10 key pieces (see Figure 5.1). Aligned with the minimalist and zero waste movements, Schwarz started her blog '*Paris to go*' to document the process of her change in lifestyle patterns, reducing her waste and consumption to zero. In 2014, Schwarz's 10 key pieces included two tops, two bottoms, two dresses, two pairs of shoes, a coat and one bag. To the key styles she added six additional seasonal and essential items, including two lightweight dresses, a special occasion dress, sunglasses, a wedding ring and a watch, for a total of 16 pieces making it a fully functional wardrobe year-round. The wardrobe is reviewed twice a year at the end of seasons with ruined items, ill-fitting pieces or those not worn getting tailored, donated, refashioned or sold.

³¹ The capsule wardrobe in the minimalist movement differs from the fast fashion system discussed in Chapter 2. The styles are classical in design, rather than fashion trend pieces, and encourage users to wear them over more extended periods and through several seasons.



Figure 5.1. The 10-piece wardrobe that includes accessories (Schwarz 2014).

Many other people are living a nomadic lifestyle—not by choice, but due to external factors. Social and civil unrest, and acts of terror are causing the displacement of many fleeing war and conflict, such as the Syrian civil war in the Middle East that began in 2011. The United Nations Refugee Agency (UNHCR) estimates that over six million displaced persons and over five million Syrians are refugees (UNHCR 2018). In a 2009 white paper, the Australian Defence Force predicted trends of demographical change and population growth and movements caused by climate change and regional conflicts would be a risk for Australia in the following two decades. Changing climate patterns, along with booming population growth means there will be increased competition for food, water and energy resources in most regions of the world; in particular, Africa and the Middle East (Commonwealth of Australia 2009) and leading to further displacement of people and cultures, placing pressure on our already dwindling material resources.

New developments that adapt our clothing to suit multiple personal and environmental needs, as well as ones that provide shelter and protection are becoming more prevalent in the commercial apparel market. Examples include transformable products such as sleeping bag tents and tents that convert to clothing. In 2016, fashion designer Angela Luna founded the company *Adiff* to design and distribute innovative products and raise awareness of the refugee crisis. She designed a collection of transformable outerwear to address the shelter and mobility challenges that confront refugees, particularly Syrian

asylum seekers. The collection sold through the website provides wearable pieces that transform into flotation devices, backpacks and tents for people in transit. One product is a convertible jacket that transforms into a two-person tent, sold commercially for \$US 350 (see Figure 5.2). *Adiff* operates as an ethical and social economic business model and through the website sells the one-size-fits-all jacket as a buy-one-give-one model; for every jacket purchased, the company donates one to a displaced person. The Jacket fabrication is a water-resistant, breathable, recycled PET plastic. The jacket incorporates internal and external pockets, and the front door panel unzips to become a scarf or hood. The style can be folded up to a small carry bag and easily transported by the user (Adiff 2018).



Figure 5.2. The worn jacket and the two-person converted tent (Adiff 2018)

5.5 Limitations and methodology

The design inspiration for the studio research implements these emerging lifestyle trends of a limited wardrobe and transformable clothing. It sets limitations on the design and number of garment patterns produced. The styles are designed for an urban environment, worn by an urban user, and incorporate flexibility and multiuse. These limitations foster creativity, and challenge the designer to produce pieces that are multifunctional and suit a variety of needs over seasonal climate changes.

The methodology of the project was to focus on digital technologies in developing the garment patterns, using the digital methods researched in Chapter 4. These methods posed complications and restrictions. The most prevalent was the lack of knowledge in the digital programs and the high cost of purchasing multiple programs. Without prior knowledge of 3D modelling or virtual prototyping, their use was an entirely new approach and learning experience in developing fashion garments. The time taken to learn the skills was substantial. It involved much frustration and required significant persistence to overcome the challenges of learning a new creative process. While not yet an expert in using the programs, I am pleased with the progress and knowledge gained by this endeavour, and feel it is a system I will continue to expand and develop beyond this Masters' research.

The limitation of garment patterns produced was a total of six styles to align with the capsule concept. The original style limit was 12 pieces to encompass a full year, but I felt this was unrealistic within the timeframe and project requirements. Including the full 12 styles may also be too overwhelming and challenging for the end user. I believe restricting the number of garments in the collection to six proposed a better design solution and presented more functional and exciting outcomes of the styles. For the project's benefit and future commercial potential, the capsule collection limit and minimalist designs are a more achievable project for the consumer who ultimately purchases the patterns.

A website was developed to enable direct dialogue between the designer and end user, facilitate open communication, and bring the end user into the discussion on the garment development process. The website aligns with new practice methods outlined in Chapter 3 and bypasses the industry's production and selling cycle, as the garment patterns are sold directly to customers and can be purchased at any time of the day or year. This is discussed further in Chapter 6.

Materials for the final inspiration artefacts in *Future Archaeology 6.0* were not all predetermined. They included found garments, leftover pieces from previous Kyotap collections, discarded materials, post-consumer waste such as old bed sheets and denim jeans, and materials that were on hand, along with fabrics and garments gifted to me by family and friends (see Figures 5.3–5.7).



Figure 5.3 These men's jeans were found on the side of the street in a plastic bag. The jeans were from well recognised fashion brands, including Country Road, Saba, and H&M.



Figure 5.4 Several old, damaged bedsheets were cut into strips and then plaited together in a continuous braid to make a twine.



Figure 5.5. Hand stitching mending exploration with cotton voile fabric offcuts stitched with cotton thread



Figure 5.6 exploration of 3D printed fabrics, these are in chain mail like formations for flexibility and movement. Printed in PLA plastic



Figure 5.7 3D my early exploration of 3D printed plastics. Printed with PLA plastic

Chapter 6: Elements and Process

6.1 Chapter introduction

This research project developed a series of experimental garment patterns and artefacts that integrate the craft skills of fashion making with the newest digital technologies. It proposes design processes that reduce environmental impact, waste and consider both the end user and the entire life cycle of the product. Through practice-based research, it will investigate a range of materials and fabrications and explore hand -making techniques, together with digital technologies such as virtual prototyping and 3D printing. The final artefacts attempt to put craftsmanship into garments and includes both low-tech and high-tech pieces that combine discarded, found and unwanted materials along with new materials to create value from post consumer waste and artefacts that inspire enduring use.

The trans-seasonal capsule range consists of six garment patterns. Each garment style is functional, addresses several functional needs and is suitable to wear throughout the year. Several of the styles are modular and can be built to form different fashion silhouettes. For example, the dress can be altered to become a top and skirt; and the jumpsuit transforms into a dress.

The complete set of six patterns, are designed in a variety of garment silhouettes for an essential wardrobe and consists of a dress, jumpsuit, pullover, vest, coat and shoe. The styles are designed to be worn over a period of a year and minimise the number of garments purchased during that time. The modular designs induce participation from the user in the garment construction process and elicit a stronger relationship between people and their things. Rather than purchasing the styles as completed garments, digital patterns are produced. These patterns are downloaded from the website, for a small cost, and produced on demand, in a variety of fabrications, materials, techniques and surface decorations dependant on the end user's preferences. This process requires designers to relinquish some control over the outcomes of the project. It exposes the construction process and transfers this knowledge to the end user, disrupting the traditional cycle of

the sale and production of fashion clothing and enlisting the consumer as a co-creator and partner in the design outcomes.

The website (see Figure 6.1) has been developed to provide direct access between the designer and end user, to facilitate open communication and discussion for the garment development process. It hosts a range of tutorials to assist with making and reusing textile materials and fashion products. E books and digital patterns can be purchased directly from the site. The website bypasses the industry's traditional supply chain and selling methods, and aligns with the new practices documented in Chapter 4. The garments are not released in line with the conventional fashion selling cycle and can be purchased at any time or day of the year. By producing patterns and not garments in universal silhouettes, they are not dictated by fashion trends but classic design shapes. This means the wearer is able to update a style, not by purchasing a new garment but by using the pattern with different upcycled materials, when the old style becomes damaged or by repairing it, thereby reducing their carbon output.

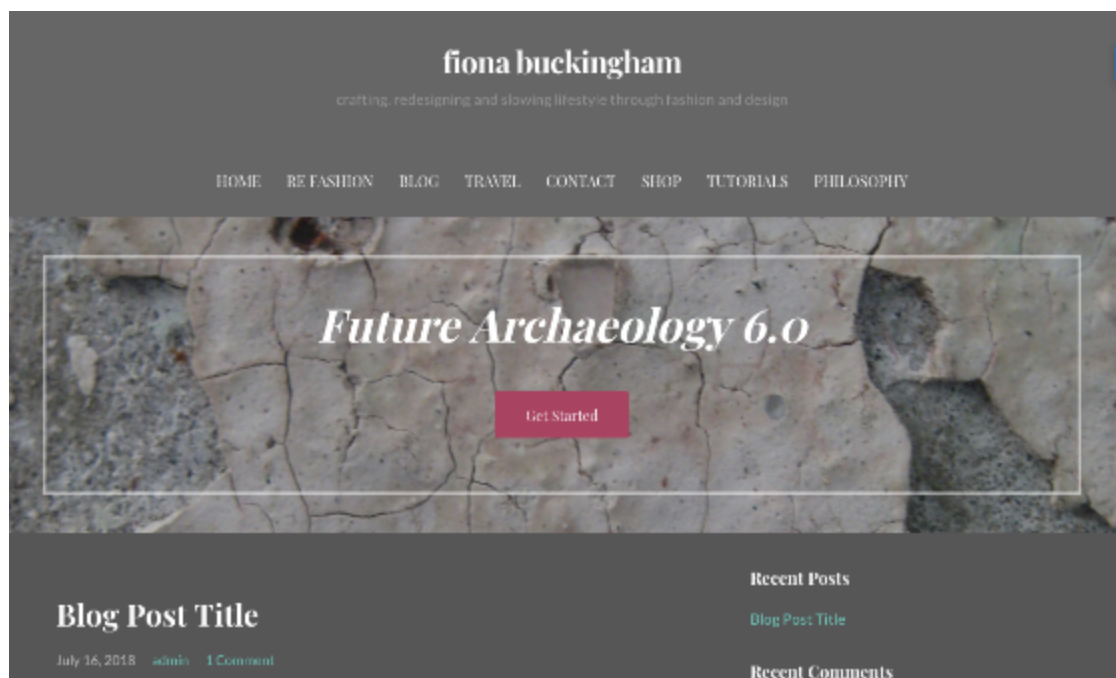


Figure 6.1. The Future Archaeology 6.0 website landing page, which has been designed and developed to educate potential end users. It details slow fashion, refashioning ideas, slowing consumption and lifestyle.

Each pattern has explored digital methods within their process, several of which are overlapping, although each piece is individual and unique in its outcome. Digital techniques explored are fundamental to the project's goal of introducing new work practices into the

creative process that reduce manual labour, time, cost, waste and environmental impact in both the design and production of garments. I also found these methods reduced the space requirements of the design studio, as most of the work is completed on a computer, which allows for a flexible and mobile working environment. I was able to design, develop and produce prototypes in a range of locations around the world including New York, Paris and Sydney.

The patterns' shapes are designed for simplicity but also allow for a variety of outcomes to be produced, based on users' requirements and their materials on hand. Several techniques are explored throughout each of the processes to develop the final patterns using a combination of virtual prototyping alongside hand draping.

The premise of the simplified styles is that someone with limited skill could reproduce the garment successfully. It encourages the user to consider fabrication and finishing techniques, explore the art of craft and making, and learn new skills. This supports making rather than consuming, and stimulates participation in design, creating value in the products they use and the clothes they wear.

6.2 Artefact 1: The Magyar dress system and process

6.2.1 *Concept and functionality*

This style is a core piece. It is made up of two simple modules that can be altered and disassembled to become different garments that can be worn individually. The main components are a top section and a skirt section.

Modular design has the potential to suppress consumption, as the product is flexible with adaptable sections, and removable portions that can grow and change over time.

The simple skirt module can be cut in varying lengths or width and fabrications for different outcomes. This style can be updated in sections rather than the complete garment. The Magyar series can be sewn as the dress only.

Ultimately, the consumer decides the final visual and fabric outcome. Each component has the potential to be sewn together to form the dress or sewn as separate modules that are joined with studs or zippers in a range of fabrication, whether upcycled fabrics from home or locally-sourced materials.

6.2.2 Silhouette and form

The Magyar series is minimalist in design and silhouette. The basic shapes are designed to simplify garment construction. The Magyar top is a two-piece pattern with a sleeve incorporated into the body of the top. The skirt consists of an oversized rectangle and can be gathered or pleated to top hem dimensions. The Magyar has an oversized and relaxed silhouette for ease of fit and comfort on the body. The simplified shapes ensure someone with limited skills could attempt to produce the garment with ease. An end user with higher skills could build on the style and experiment further with the construction, as shown in Figure 6.5. The skirt module is also designed to be worn with artefact 2, the travel suit.

6.2.3 Methodology and process



Figure 6. 2. The half scale marquette Dolman dress draping sample includes both top and skirt modules. There are two skirt variations; one is gathered, the other is pleated. These are attached with the same press stud panel system



Figure 6.3. The half scale pattern of the Magyar top module.



Figure 6.4. Image of the Magyar dress on the Clo3D avatar. The fit of the Magyar dress was altered in the program. The fabrication shown is a lightweight cotton.



Figure 6.5. Full -scale garment showing the removable skirt attached with two open-ended zippers. One 75 cm zipper is placed to the waistline edge of the top and the second is 2 cm above. The zippers run along the garment in the opposite direction as spate pieces. The zippers remove to create two separate styles, a top and a skirt. The centre back seam is joined together with another 50cm open- end zipper. Two fabrics used are a light-weight silk and a viscose/ silk.

6.2.4 Construction methods and maker's instructions

The Magyar series is a downloadable digital file with construction instructions in an accompanying E book.

6.3 Artefact 2: The travel suit system and process

6.3.1 Concept and functionality

The design is multifunctional and shapeshifting. The wearable piece is designed to accommodate travel and movement. It enables the user flexibility when travelling from destination to destination, particularly when riding a bike. The design combines a jumpsuit and dress into one garment.

Worn as a jumpsuit when riding or in movement, the inner leg zips closed to form pants. When unzipped to separate the legs, the garment forms a dress. The dress can be worn with the legs open and is free-flowing. The open-ended zipper allows it to be connected to another pattern, such as the Magyar skirt, and forms a design insert in the dress; thus, the jumpsuit is transformed into a more elevated look and fashion-forward style.

6.3.2 Silhouette and form

The travel suit is an oversized and exaggerated silhouette designed to sit off the body. The jumpsuit has a relaxed and comfortable style with front side tucks and a dropped crotch to enhance the shape. This allows additional room for movement and comfort when walking, riding or even running.

The fabric cutaway from the inner leg can be sewn onto the outer leg as functional pockets if desired and reduces fabric wastage. The patterns shapes are simplified, consisting of two fundamental shapes. The front body pattern is cut on the fold and a back pattern is cut as a pair with a seam at the centre back. (see Figure 6.8). A zipper is inserted in the centre back and an open-ended zipper on the inner leg seam.

6.3.3 Methodology and process

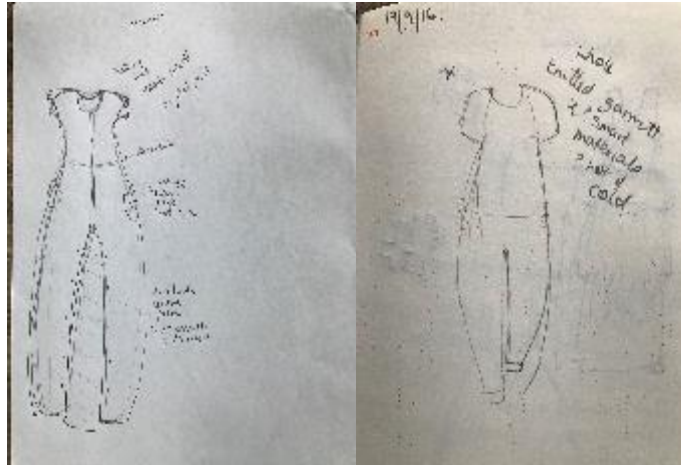


Figure 6.6. Initial hand drawn sketches of the travel suit.



Figure 6.7. Hand draping utilised to develop initial designs in half scale. The marquette on the left is for the shape and proportion, and the right image includes the inner leg zipper.

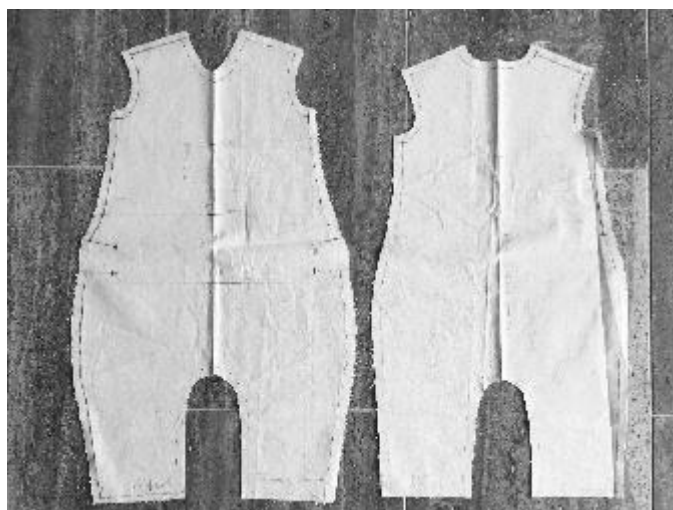


Figure 6.8. Half scale pattern.

Once the half scale pattern was draped (see figure 6.8) the pieces were digitised and scaled to a full size in a patternmaking system, Gerber. The files were then converted to a DFX file ready to be imported into garment prototyping program.

The converted into a digital pattern was imported into the Clo3D interface (see Figure 6.9). On the right is the two dimensional pattern. The blue lines indicate the original imported pattern. The fit was too high in the crotch and the leg too short. This pattern was altered inside the program and shaped for a better fit around the crotch and inner leg. The pattern was also been lengthened in the program. The left hand screen shows the garment sewn on the avatar.

This virtual sampling process was much quicker and easier to visualise on the body with the avatar. To complete this by hand in a typical studio would be a more time-consuming and higher material waste produced as going back and forth between 2D and 3D with physical pattern amendments, and a second and third sample constructed on an industrial machine.

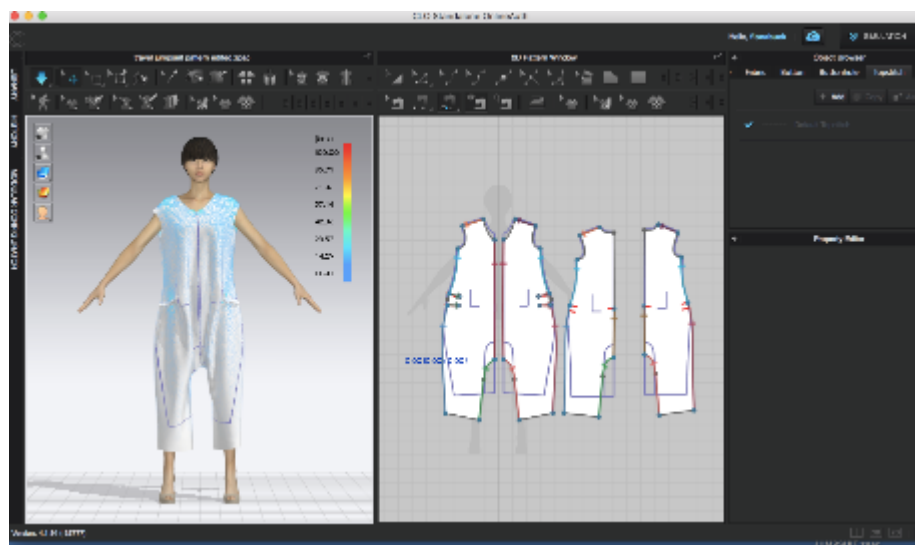


Figure 6.9. A screen shot of the travel suit in Clo3D interface



Figure 6.10. Once the pattern was finalised, fabric was uploaded to show the travel suit on an avatar in a lightweight denim chambray



Figure 6.11. The travel suit full scale sample in a mid-weight ponti

6.3.4 Construction methods and maker's instructions

The travel suit is a downloadable digital file with construction instructions available as an ebook.

6.4 Artefact 3: The jumper elements and process

6.4.1 *Concept and functionality*

The pattern is an oversized unisex raglan jumper. The shape is universal and can be produced with a range of techniques in a variety of fabrications, from a whole garment knitted, hand knitted or cut and sewn by machine. This style combines multiple techniques within the design. It can use a range of materials, from upcycled materials and recycled denim to lightweight fabrications such as silks and cotton voile. The simple design allows for a range of skills sets to make this garment with relative ease.

6.4.2 *Silhouette and form*

Raglan silhouette, garment can be lengthened with ease to formulate a dress. The oversized shape and relaxed fit require no darts. The jumper has oversized cuffs and waistband.

6.4.3 *Methodology and process*

After initial sketches were developed (see figure 6.12), calico patterns were developed through hand patternmaking techniques. A sample garment created from leftover fabric in a cotton fleece. The pattern was examined for fit on the body, once approved these were converted to a digital file and graded on the Gerber patternmaking program (see figure 6.4). The sample garment construction was completed with up-cycled denim found from men's discarded jeans (see figure 6.5).



Figure 6.12. Initial sketches of the jumper design.



Figure 6.13. The jumper was created by hand through flat patternmaking.

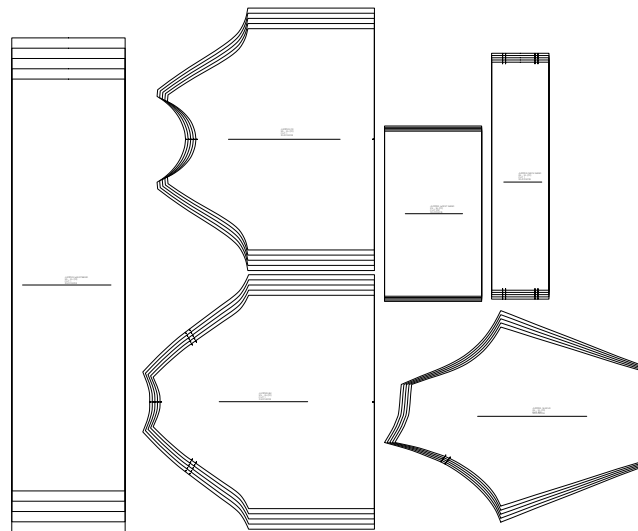


Figure 6.14. PDF image of the digital jumper pattern. It includes a full grade of five sizes from extra small to extra large. There are six pattern pieces: front, back, sleeve, waistband cuff, sleeve cuff and neckband.



Figure 6.15. Jumper sample was created from discarded jeans found on the side of the road in Bronte. The back waistband was not needed as the finishing was created with the jean waistband.

6.4.4 Construction methods and maker's instructions

The jumper digital pattern comes with a PDF document that includes key instructions and making notes for DIY home construction.

6.5 Artefact 4: Coil amour top system and process

6.5.1 Concept and function

The premise of this style is to investigate creating value from post-consumer waste using hand making skills and techniques to explore a variety of outcomes. This artefact is constructed from my own damaged bed sheets. As the bottom sheet was torn I was considering discarding them in the waste bin. I wanted to investigate whether this product could be upcycled into a fashion garment. There were several key elements I wanted to explore in the prototype. How to create value in a waste product after it is was no longer fit for purpose. Could this simple material be turned into a more fashionable design item? Could a person produce the product with limited fashion and design skills? Could the product be made by hand and without the use of industrial machinery such as a sewing machine? Does the product have the potential to be remade into another design?

To do this, I felt I needed to deconstruct the material so it did not bear a resemblance to its previous life as a bed sheet. Two full sheets sets were used and torn into small linear strips approximately 1–2 inches wide. Three strips of fabric were braided together to form a long, single twine rope. The rope was then draped from top to bottom on a female dress form. The braids are attached and linked together by interweaving with single strips of fabric, without the need for hand stitching or machine sewing. The interconnecting fabric strips can easily be removed, returning the garment to a single length braid to be redesigned into another product.

6.5.2 Silhouette and form

It is an innovative and creative garment with an organic style. It is free form in design with the outcome determined by the end user. Without a predetermined silhouette, it can be manipulated into any style or shape to cover the body. It is constructed with materials on hand and aims to take discarded and low-value materials and reposition their value through crafting. The knitted top is a handicraft item constructed from a bed sheet twine

but can be made from virtually any material on hand or discarded remnants plaited together to create the twine. The twine constructs a knitted shape that is worn as an addition garment, such as a top, vest or jumper. When the style is no longer needed or wanted, it can be converted into a carry-all bag to transport belongings or returned to the original twine and re-knitted into a new style or a larger or smaller size.

Rather than developing the end product or digital pattern, a video tutorial of the concept would be available on the website, along with key design and size measurements as a guide reference for consumers to create their design from textile and garment waste.

6.5.3 Methodology and process



Figure 6.16. The old bedsheets were cut into narrow strips of fabric, then plaited together to form the twine. The twine is a continuous strip that can be knitted or woven into any form or structure.



Figure 6.17. The bedsheet twine was hand dyed to change the original colour and give a more fashionable and contemporary look.



Figure 6.18. Experiments with knitting techniques of the bedsheet twine.

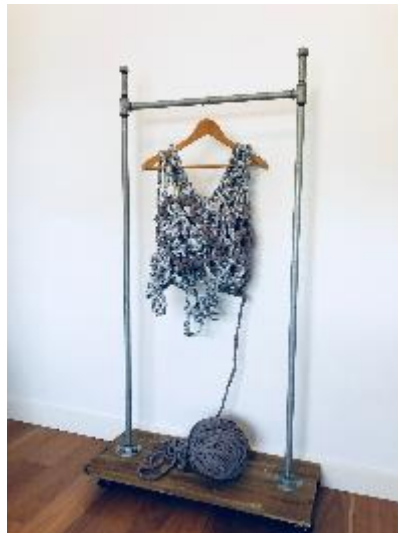


Figure 6.19. Images show a sample of the constructed vest in a freeform knitting method.



Figure 6.20. Experiments with the twine by free form knitting and interlinking the twine to give a more three dimensional effect.

6.5.1 Construction methods and maker's instructions

Hand constructed and then freestyle hand knitted. This garment can be pulled apart and redesigned into a new garment. A DIY instruction video is shown on the website; that is, freeform knitting instructions. This garment can be pulled apart and redesigned into a new garment.

6.6 Artefact 5: The digital shoe system and process

6.6.1 Concept and functionality

The convertible shoe is a multifunctional design and has two shoes incorporated into one design: a high heel and a flat shoe. The two-in-one shoe eliminates the need for multiple shoes to be purchased. The outer design is a high heel style to a more formal and elevated design worn for work and special events. The inner shoe design is a flat style that is a more functional and comfortable style suitable for walking and travelling. The inner shoe slips inside the outer design when the wearer is required to walk distances. Both shoes can be worn together as one shoe or individually. The prototype is a multifunctional design that changes dependence on the end use and the environment. The shoe's future potential includes wearable technical aspects such as a step pedometer, light and sound sensors, and being produced with more advanced materials such as bioplastics, including Algix and Ninja Flex.

6.6.2 Silhouette and form

The inner shoe is printed in a flexible material for extra comfort. The open structure of the inner shoe allows breathability for the foot and prevents sweating. The outer high heel shoe is made up of a more structured, hard plastic material to support the weight of the body. The prototype design has the future potential to be print as one unit in multi-materials with advanced 3D printers such as the *Connex 500* by *1 materialise*.

6.6.3 Methodology and process

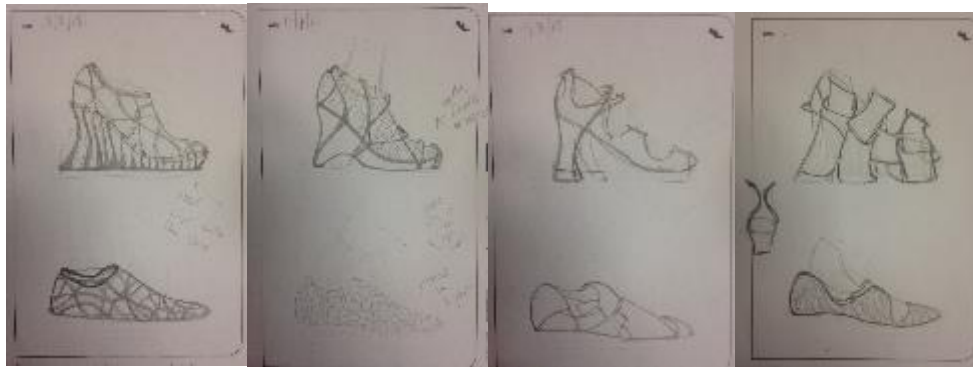


Figure 6.21. Initial sketches of the shoe designs. The are several iterations of designs to see how the styles would work together.



Figure 6.22. Image shows the hand sketch drawing of selected shoe design to be developed.

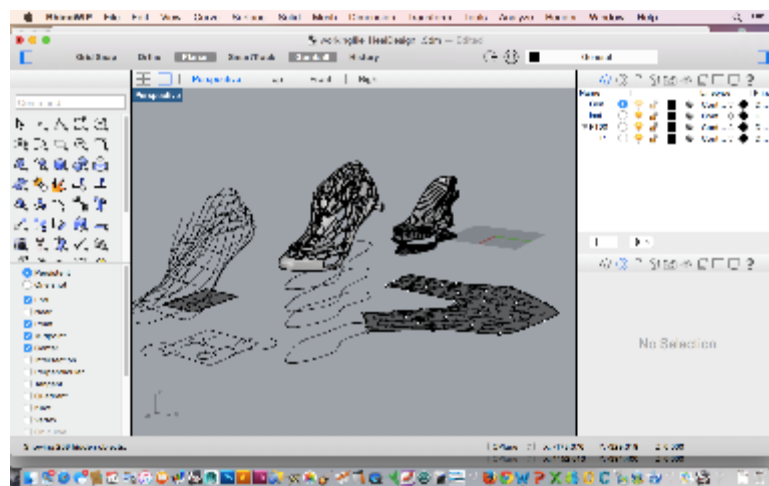


Figure 6.23. Experiments and work in progress of the shoes created in the program Rhino3D. Both shoes were completely developed in the program.

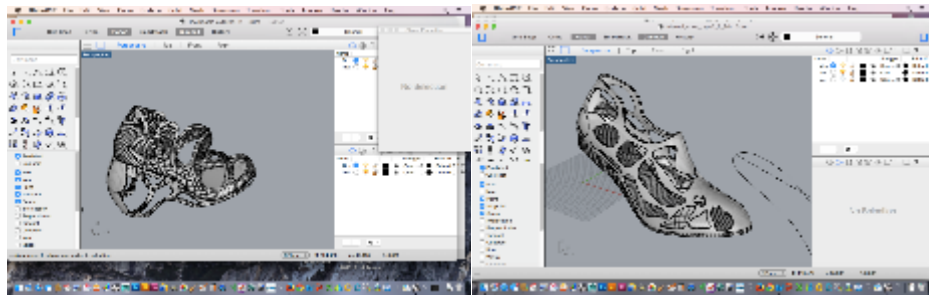


Figure 6.24. Working designs of the internal and external shoes in Rhino 3D.

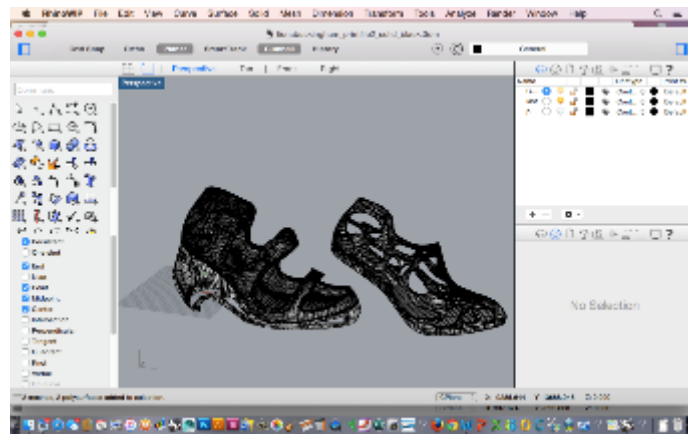


Figure 6.25. Final design of both inner and outer as a mesh file ready for converting to an STL file for 3D printing



Figure 6.26. Half scale 3D inner shoe in a flexible nylon. This is printed with a SLS (Selected Laser Sintering) printer.



Figure 6.27. Full scale sample of the 3D printed outer and inner shoe. Made from ABS plastic.

6.6.4 Construction methods and maker's instructions

The digital shoe is offered as an STL file that is downloaded and then 3D printed either at home or using a 3D printing service.

6.7 Artefact 6: Origami jacket system and process

6.7.1 Concept and functionality

The origami jacket is a contemporary design that completes the capsule collection. It is a layering piece in a trans-seasonal style designed to be worn throughout the year and coordinates with any of the other pieces in the series. The jacket can be styled over the Magyar dress, the travel suit, or the raglan pullover and produced in a range of fabrications, weights and compositions. The garment and sleeve length can be altered depending on the end user's requirements and climate conditions.

6.7.2 Silhouette and form

This jacket is an exaggerated silhouette over the body to give a modern and contemporary appearance. The pattern has been designed to minimise waste with only two pattern pieces produced. Body shaping is created with internal feature darts that require no cutting, just topstitching the darts for fit. The jacket is cut from a rectangle shape and side seam cutaway can be used for pocketing to reduce fabric wastage. The sleeve design has been incorporated into the body of the garment, thus eliminating an extra sleeve pattern. A replica of the pattern can be cut in lightweight material for a lining.

The lining can be attached to the outer jacket for extra warmth in colder climates, removed in hotter temperatures, or worn on its own as a lightweight mid-season jacket.

6.7.3 Methodology and process



Figure 6.28. Hand sketch of the original design development



Figure 6.29. Origami jacket half scale Marquette, front and back. Material is a cotton canvas.

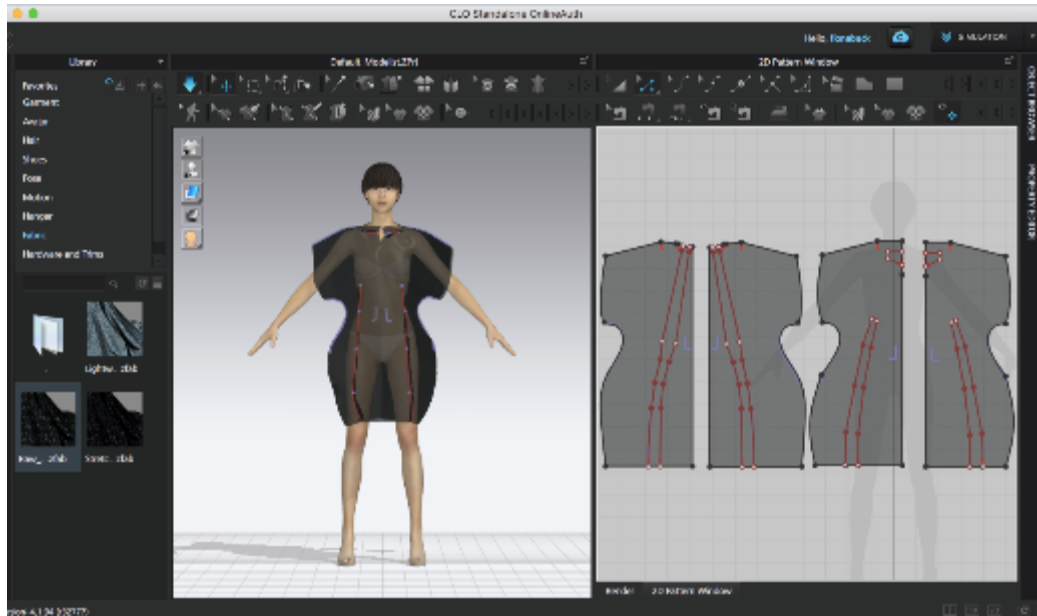
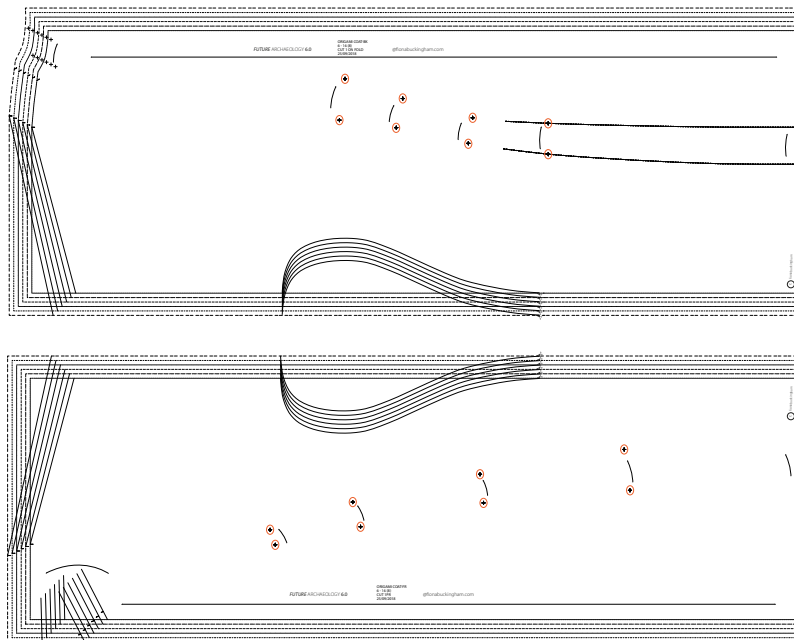


Figure 6.30. The origami jacket pattern was imported into the program Clo3D. The 2D pattern is on the right and on the left is the sewn garment on the avatar. The fabrication on the avatar is shown as sheer to see the pressure points and shape over the body. The imported patterns have the internal fitting dart on the 2 D pattern highlighted in red.



Figures 6.31. Origami jacket final digital pattern. This shows size range from xs to xl and consists of only two pattern pieces. The style requires minimal cutting with internal darts for shaping. The patterns can be placed together to limited fabric waste during cutting. Side seam shape cutaway can be incorporated into pockets on final garment.



Figure 6.32. Full- scale Artefact 6 Origami jacket constructed from recycled denim.

6.7.4 Construction methods and maker's instructions

The origami jacket digital pattern comes with a PDF document including key instructions and making notes for DIY home construction.

Chapter 7: Future Archaeology 6.0 Exhibition

The exhibition Future Archaeology 6.0 at the MLC gallery in Newtown, Sydney NSW ran from the 9th –13th October 2018 and consisted of the final inspiration pieces, the website, digital and hard copy examples of the e-patterns and construction books.



Figure 6.33. Exhibition Future Archaeology 6.0 Final garment inspiration pieces with full -scale digital pattern printed.



Figure 6.34. Exhibition Future Archaeology 6.0 garment inspiration pieces, Artefact 1 & Artefact 4,



Figure 6.35. Printed copy of digital instruction booklet and full scale pattern.

7.1 Conclusion

This research dissertation documents the historical and recent changes in the fashion industry from a systems approach. While it broadly examines the fashion cycle, its main aim was to provide a view from the designers' perspective. Changing the fashion system, its workers and their consumers to a more sustainable future are complex and multifaceted. The thesis demonstrates through a range of experimental approaches, ways for the fashion practitioner to develop clothing and garment products that can minimise waste, resources, and consider product lifecycle. By integrating craft skills and new digital technologies within fashion making it explores design processes that reduce the environmental impact of clothing and considers both the end user and use patterns of the product. Engaging consumers and designers in co-design it offers a glimpse into the potential future of participatory design within the fashion designer's practice that encourages consumers to keep, use less, and recycle their garments. The project outcomes document emerging fashion business models outside the current economic system with the sharing of information to empower individuals with knowledge and craft making skills. This research and its experimental outcomes provides a foundation and resource for my future design practice and offer techniques and methods to future fashion designers to develop systems and practices in this field that are creative and

aligned with a more sustainable future in the broader social system in which fashion operates.

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Appendix A: Timetable

MASTERS OF DESIGN (RESEARCH)- TIMELINE FIONA BUCKINGHAM

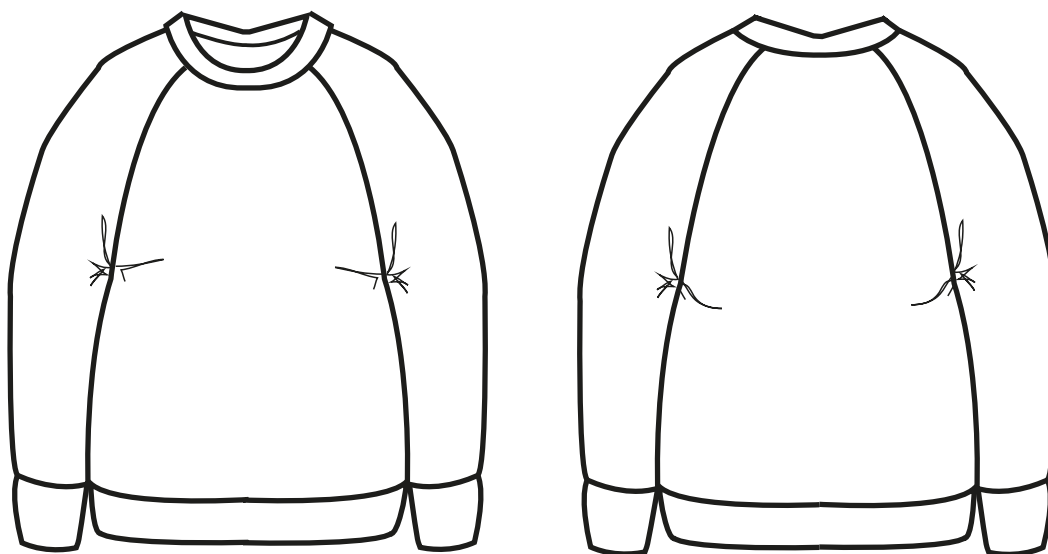
	March 2018- June 2018						JULY 2018- DEC-2018				JULY 2018 -DEC 2018			
TOPIC	Semester 4					break	Semester 5				Semester 5			
	development						finalising							
	mar	apr	may	jun	july		topic		aug	sept	oct	nov		
class-							supervision meetings							
thesis research							final studio production							
literature review							thesis finalising							
literature review							reflective journal writing							
timeline							THESIS submission-			31st Aug 2018				
supervision meetings							Exhibition date week of 9th- 13 Oct 2018							
table of content														
studio research														
ethics workshop														
interviews														
thesis finalising														
thesis writing boot camp														
conferences/ field trip														
design research														
design development														
garment prototyping 1-2														
garment prototyping 3-4														
garment prototyping 5-6														
final artifact -studio production														
shoe workshops														
knit workshop														
annual review														
reflective journal writing														

Appendix B: Work in progress in from cite studio residency
Paris



Appendix C: Artefact 3: Jumper E book

FUTURE ARCHAEOLOGY 6.0



ARTEFACT 3: Raglan *jumper*

Sizes XS –XL beginner to advanced sewer

Contents

1. About Future Archaeology 6.0 Patterns
2. Garment overview and suggested fabrics
3. Sizing and garment measurements
4. Printing the pattern
5. Printing plan
6. Fabric requirements and suggested cutting plans
7. Instructions
8. Glossary

About future archaeology 6.0 patterns

PATTERN

Future Archaeology patterns are design to simplify and demystify the garment construction process. The pattern styles are designed by fashion designer and researcher fiona buckingham to enable you to create innovative, interesting designer garments at an affordable price at home. It encourages the end user to engage in the art of fashion, making and craft. The patterns are designed for ease of construction. The finishing techniques are less traditional and can be applied for an original and well-made garment. The simplified silhouette allows for a range of skill sets to make this garment with relative ease.

SLOW FASHION

The patterns are part of the slow fashion movement that encourages wearers to buy less, recycle and reuse their clothing and materials. The patterns in the *future archaeology* series are modular and allow for updating sections of the patterns rather than the whole garment. The patterns disrupt the typical industry process of buy discard buy discard. This jumper pattern is part of a series of 6 designs that will complete a functional wardrobe for the year. All of the styles can be worn separately or intersect and layered together as looks. This supports making rather than consuming, and stimulates participation in design, creating a sense of achievement, and value and use to the clothes they make and wear.

FABRICS

The shape is universal and can be produced with a range of techniques in a variety of fabrications. It can use a range of materials, from upcycled materials and recycled denim to lightweight fabrications such as silks and cotton voile.

The pattern is a universal shape that allows for a range of material that can be utilized in the one design. The shapes encourage you to experiment and be creative in the selection of fabrications. Not limited to store bought materials but the style can incorporate upcycled materials or recycled textiles for a more innovative and one off look. In saying that please consider its purpose and if requiring a large amount of movement and flexibility consider using a fabric that has a relaxed weave or a flexible knit such as a jersey. Consider fabrications that will work with pieces that are already in your wardrobe so they compliment what is already there.

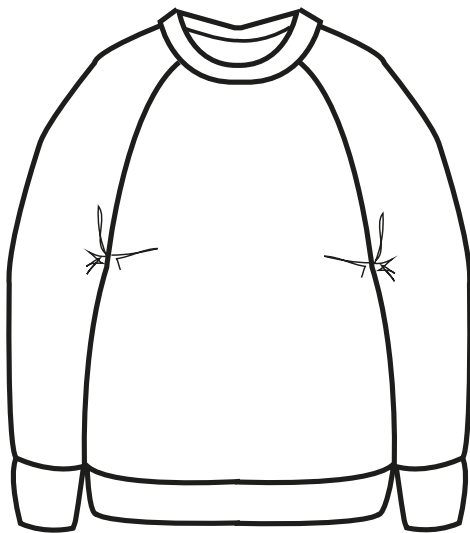
THE ENVIRONMENT

Please consider the environment when printing the e book. If you do print your e book, please recycle the paper after finishing with it to ensure a closed loop cycle.

KEEP IN TOUCH

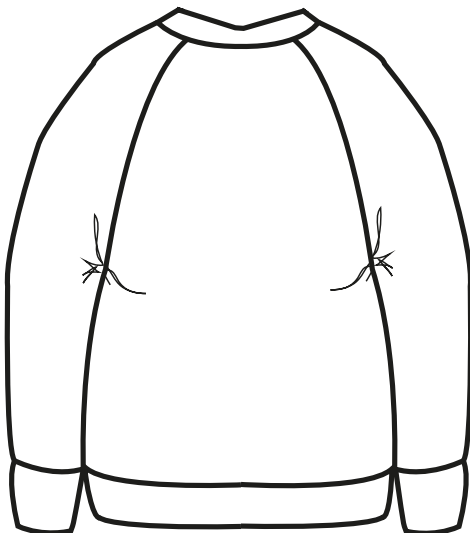
Find us on instagram @futurearchaeology and @fionabuckingham and tag us with your photos of your completed garments

Garment overview and suggested fabrics



GARMENT DETAILS

The raglan jumper is a relaxed oversized style. It is a pullover garment and has knit neckline, sleeve and waist cuffs that negate the necessity for opening and closures on the garment.



FABRIC SUGGESTIONS

It is important to use a knit fabric for the neckline, sleeve and waistband cuff. A one way or two way knit typical for pullover designs, for example cotton rib, cotton jersey or wool jersey with heavier fabrics.

Many woven fabrics can be used for this garment. Soft fabrics such as silks, viscose and linens will give a softer more relaxed silhouette. Cotton drill, wool, and blended woven fabrics will give a more structured silhouette and sit off the body for an exaggerated shape. We encourage you to upcycle fabrics or old garments that can be revitalized into a new garment.

Sizing and garment measurements

All measurements are in cm and refer to the standard body measurements for our size range

size	xs	s	m	l	xl	xxl
	6	8	10	12	14	16
bust	81.5	87	92	97	102	107
waist	63.5	69	74	79	84	89
hip	90.5	93	98	103	108	113

INTERNATIONAL SIZE CONVERSION CHART

	xs	s	m	l	xl	xxl
AUSTRALIA	6	8	10	12	14	16
UK	8	10	12	14	16	18
USA	4	6	8	10	12	14
ITALY	40	42	44	46	48	50
FRANCE	36	38	40	42	44	46
GERMANY	36	38	40	42	44	46
JAPAN	7	9	11	13	15	17

Taking your measurements:

If your measurements fall between sizes, use the finished measurements above to help you select your size.

The pattern is drafted for height of 170cm (5'7").

Printing the Pattern

PAPER SIZE

This pattern can be printed on both A4 or US letter-sized paper. This pattern can be printed on both A4 or US letter-sized paper. There is also a full sized version included so that, if you'd prefer, you can get it printed in full sheets (3 x A0) at your local copy shop.

LAYERS

This pattern has embedded layers. This means that you can select only the size/s you would like to print.

Layers make it much less confusing to cut out the pattern, and also saves on ink (and paper in some cases).

Open the pattern in Adobe Reader and click on the 'layers' option on the left hand side. There will be an eye next to each layer in the pattern. Turn off (by clicking) all the layers you do not need. Please note, at the time of publishing, layers are not available on Preview (Mac). You will need to install Adobe Reader to access this feature.

The 'PATTERN INFO' layer needs to be on for all sizes.

SCALING

Open the pattern in Adobe Reader. Before printing the file, you will need to check the scaling settings on your printer. The pattern needs to be printed at its true scale. To do this, go into your print settings and select 'actual size' or set page scaling to 'none' or 'turn off page scaling.'

Print only Page 1 of the pattern, and check that the large test square measures 5cm x 5cm, or the smaller one measures 1in x 1in. It really needs to be precise, so if it is not quite right, you will need to go back and check your printer settings again.

ASSEMBLE

Cut around the border of each page - one long side and one short side (keep your choice of sides consistent between pages). Align the circles so that 1A matches up to 1A, 2A with 2A etc, and tape or glue in place. Use the printing plan on p. 7 as a reference, if required.

You will notice that the print-at-home version of the pattern is broken into smaller portions, so that it is easier for you to manage if you have limited space for cutting.

Please note: When printing from Adobe Reader, make sure the print orientation is set to "Auto portrait / landscape" - this will ensure the border of each page will be printed.

Printing Plan

Note:

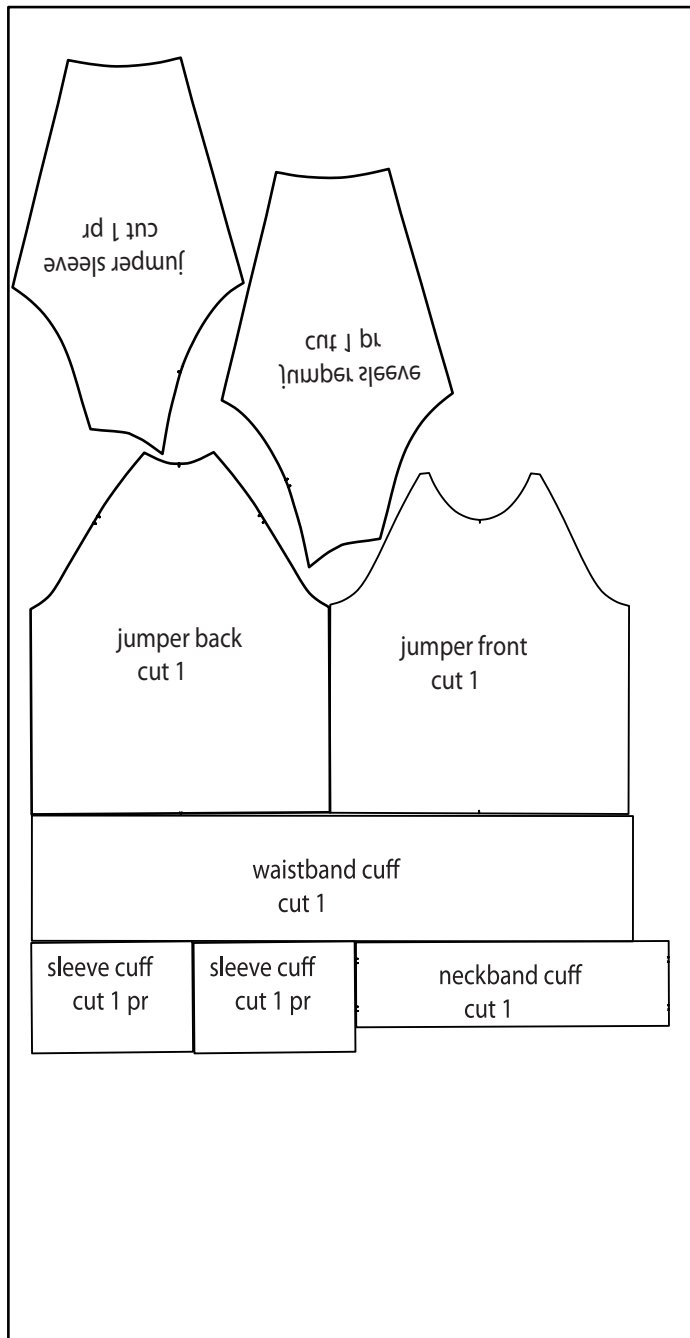
This pattern has layers, which means you can just print the size/s you need. Be sure to keep the 'PATTERN INFO' layer on, as this layer includes all cutting information etc. For more information look to page -

Fabric requirements and suggested cutting plans

115cm / 45in fabric*

150cm / 60in fabric

You will need approximately 1.5m of fabric for this style.



Pieces to cut :

- 1 - Front Bodice - cut 1
- 2 - Back Bodice - cut 1
- 3 - Sleeve -cut 1 pair
- 4 - Neck band cut 1
- 5 - Sleeve cuff band -cut 1 pair
- 6 - Hem cuff band- cut 1

Tip

Although cutting on the fold is the fastest way to cut your fabric. Industry standard is to cut the garments on the flat (fabric is not folded) full width of fabric with each piece cut independently, This will ultimately use less fabric.

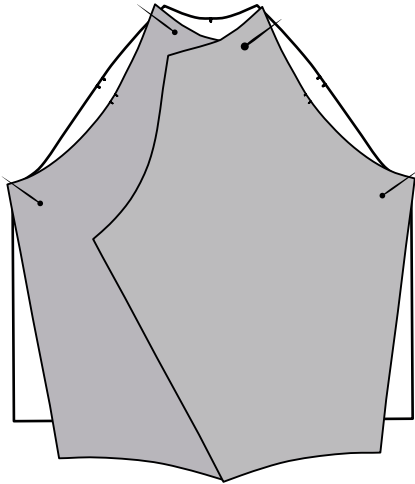
If you use this method, when cutting a pair, be sure to cut one piece with the pattern face up, and then the other with the pattern face down.

Instructions

These instructions will guide you through the process of making the raglan jumper.

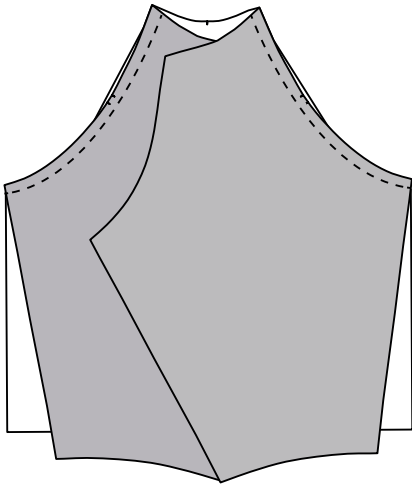
Wrong
side

Right
side



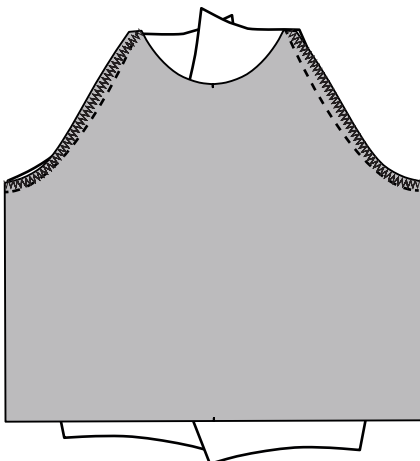
STEP: 1

Take the back bodice and the sleeves. Pin the back sleeve to the back bodice seam line with right sides together. (The back sleeve and bodice is marked on the pattern with two notches).



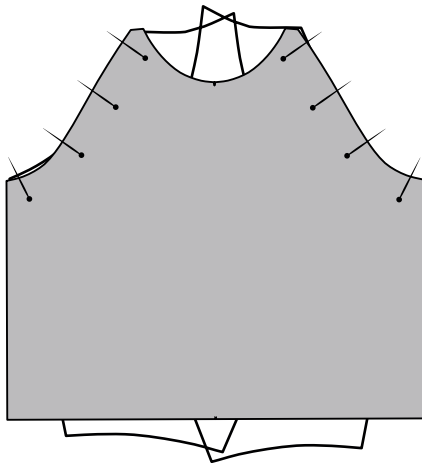
STEP: 2

With a 1 cm seam allowance stitch the seams together.



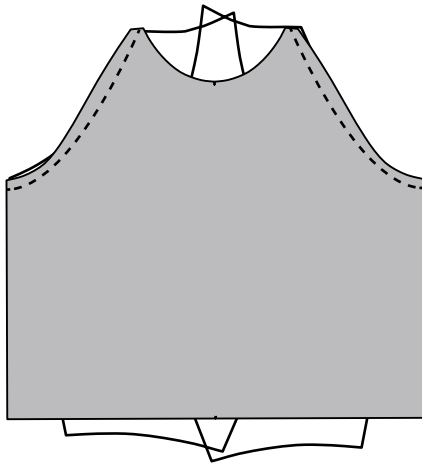
STEP: 3

Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.



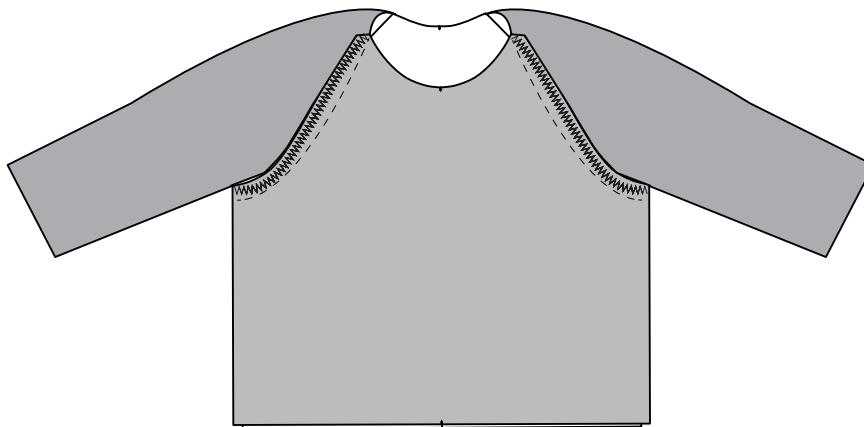
STEP: 4

Take front bodice and pin front sleeve to front bodice right sides together.



STEP: 5

With a 1cm seam allowance stitch the seams together.

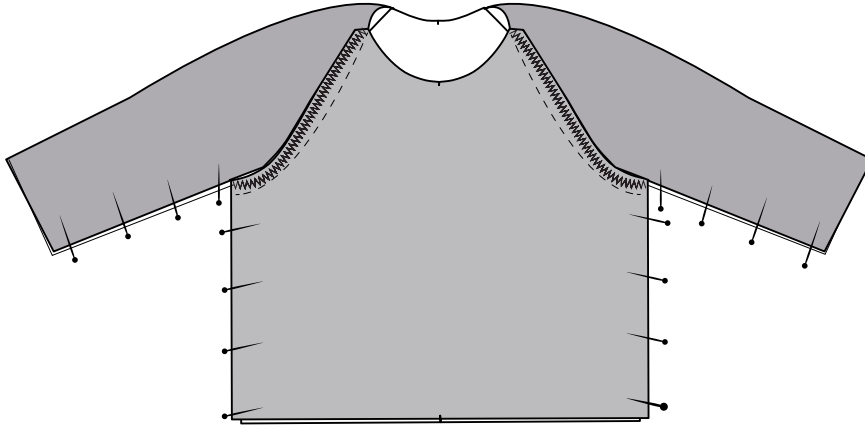


STEP: 6

Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.

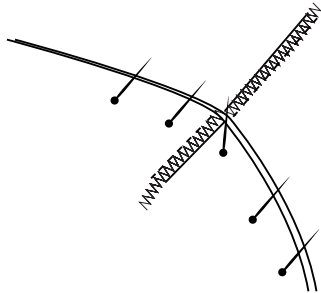
STEP: 7

Lay garment flat with front bodice facing up. The jumper should still be inside out. Pin sleeve underarm and side seams together.



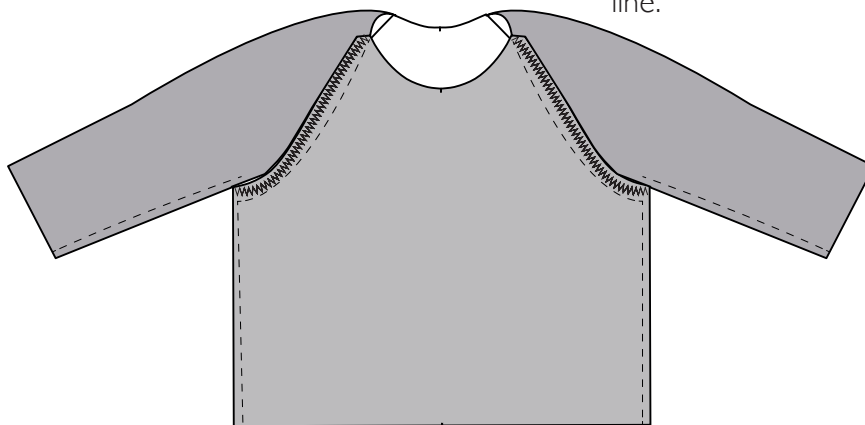
STEP: 8

Ensure that the front and back underarm seam junctions are meeting at the same point.



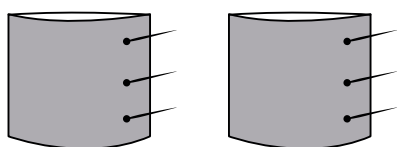
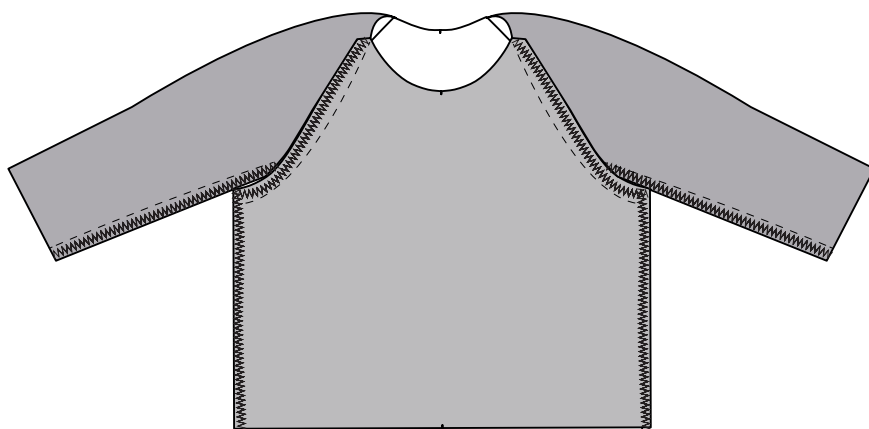
STEP: 9

With a 1cm seam allowance stitch the seams together from the sleeve through to the waistline.



STEP: 10

Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.

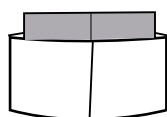
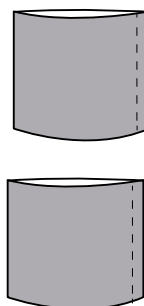


STEP: 11

Take and fold each sleeve cuff and with right sides together. Pin along the longer seam edge.

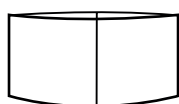
STEP: 12

With a 1 cm seam allowance stitch the seams together.



STEP: 13

Take one cuff and fold it back onto itself, with wrong sides together. With right side facing out match the stitched seam together at wrist point.

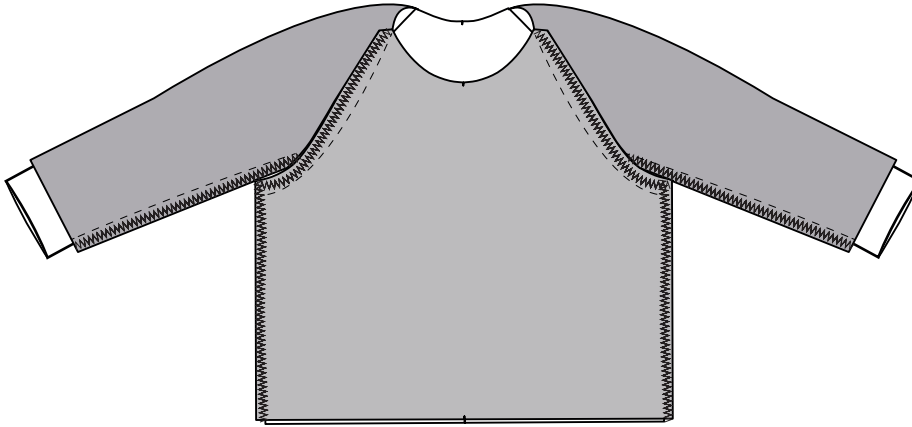


STEP: 14

Repeat the process for the second cuff.

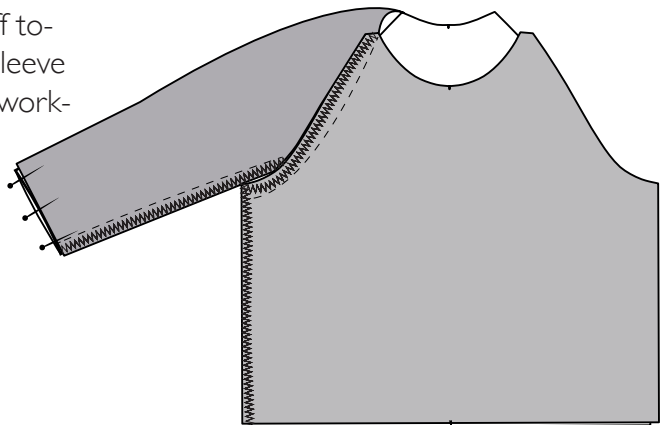
STEP: 15

Take one of the folded cuffs, still with right side facing out, and insert it into left sleeve with folded edge first. The sleeve should have the wrong side facing out so that you will see the overlocked edge.



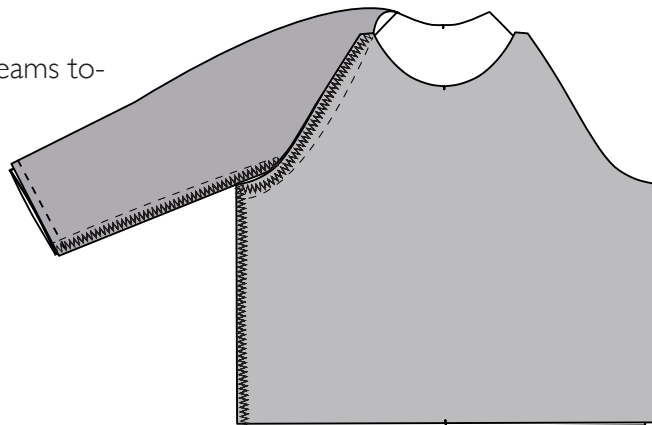
STEP: 16

Match the raw edge of the sleeve and cuff together. Be sure to align the seams of the sleeve and cuff together. Pin the edges together working your way along the cuff



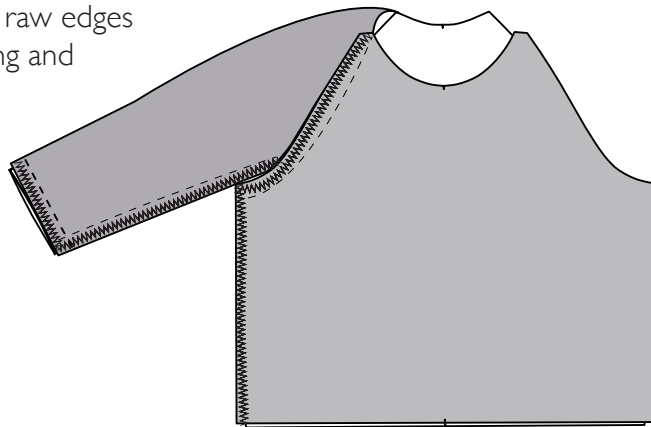
STEP: 17

With a 1cm seam allowance stitch the seams together.



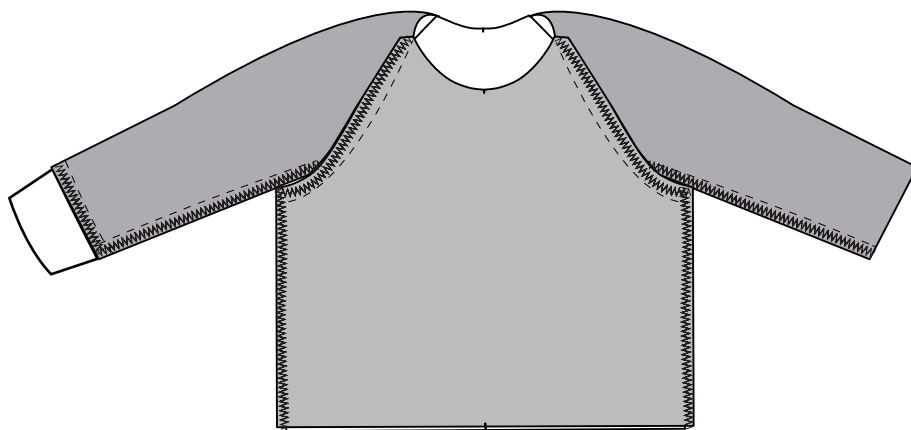
STEP: 18

Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.



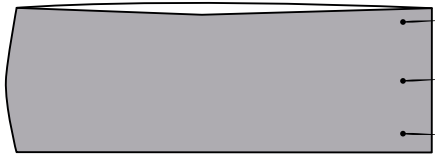
STEP: 19

Pull the cuff through so that the folded seam edge is now the end of the sleeve.



STEP: 20

Repeat steps 15-18 for the other cuff

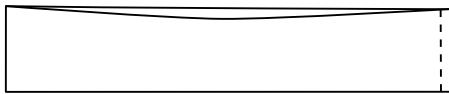
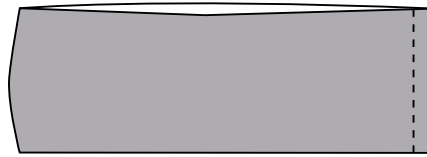


STEP: 21

Take the waistband cuff and pin the short seam right sides together

STEP: 22

With a 1cm seam allowance stitch the seams together. You do not need to overlock this edge as it will be an internal seam

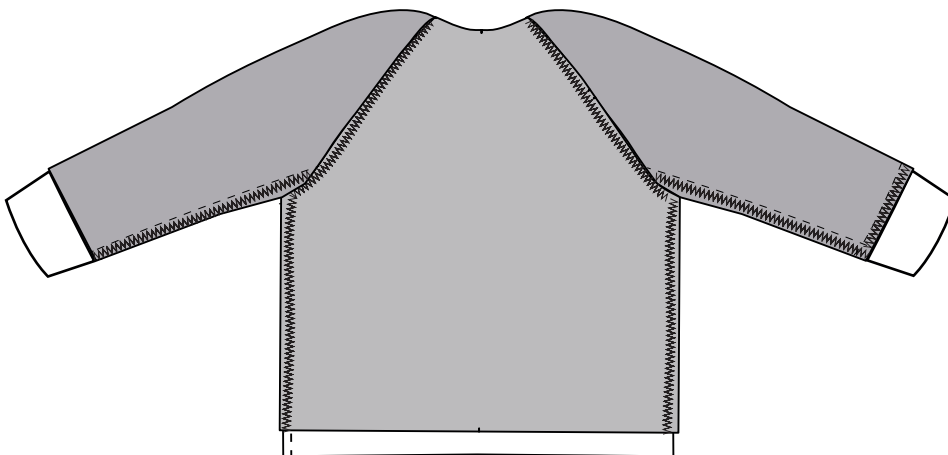


STEP: 23

Take the waistband cuff and fold it in half lengthwise with wrong sides together and right side facing out.

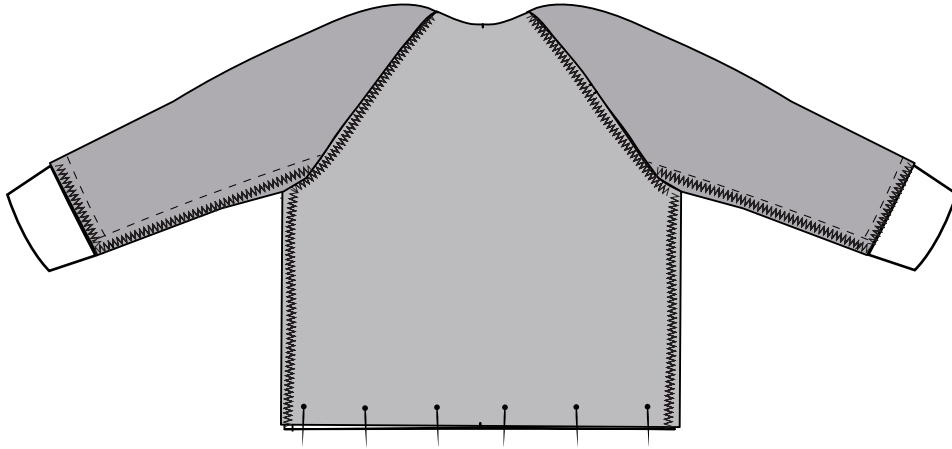
STEP: 24

Insert the waistband cuff into the hem of the jumper



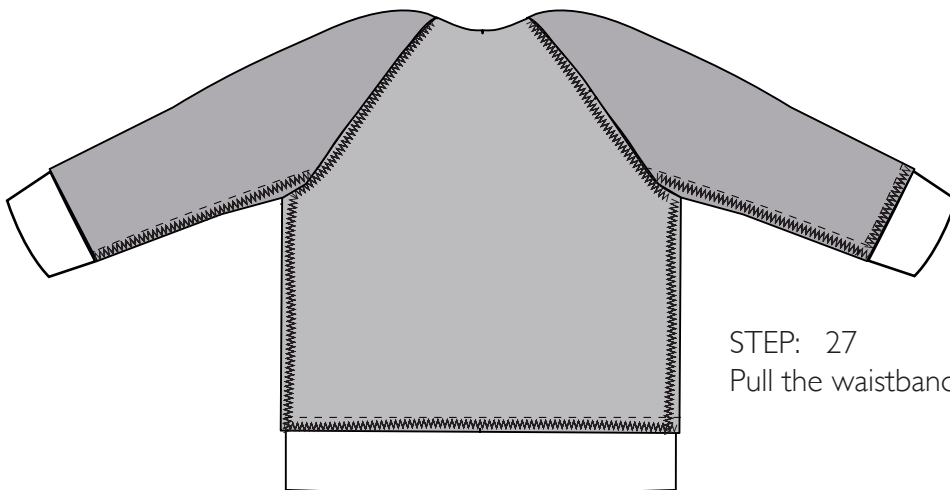
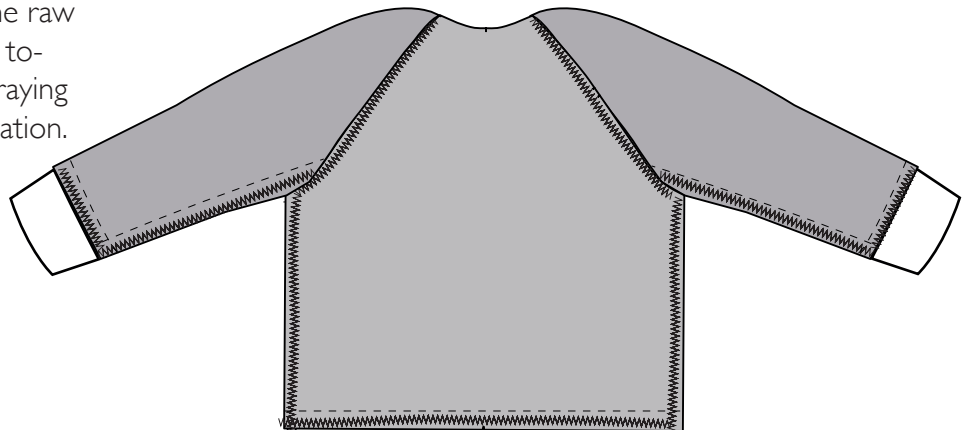
STEP: 25

Pin the waistband cuff to the jumper hemline with the jumper inside out, so that you can see the overlocking on the side seams. (The same process as the sleeve and cuff) . Be sure to match up the waistband cuff to one on the side seam junctions.



STEP: 26

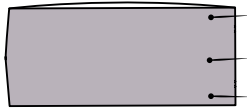
With a 1 cm seam allowance stitch the seams together: Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.



STEP: 27

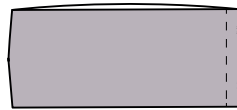
Pull the waistband cuff through

**neckband cuff
cut 1**



STEP: 28

Take the neckline cuff and pin short seams with right sides together.



STEP: 29

With a 1cm seam allowance stitch the seams together. You do not need to overlock this edge as it will be an internal seam

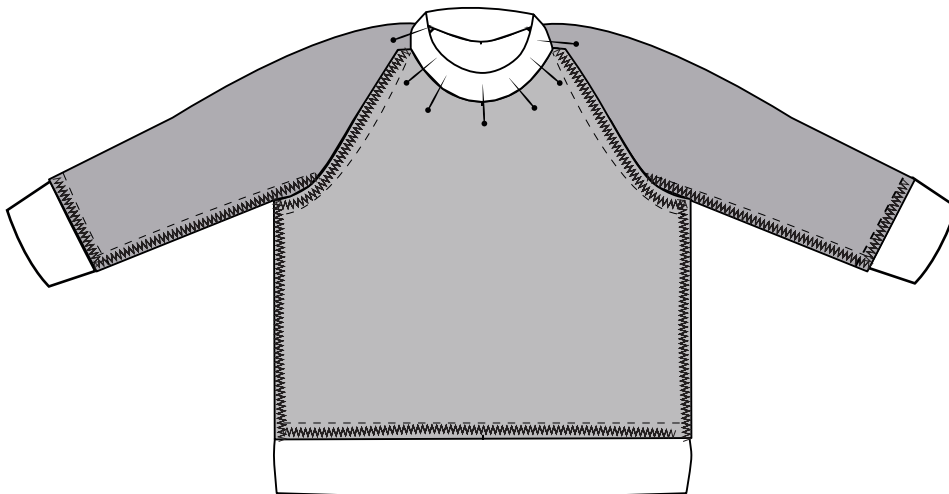


STEP: 30

Take the neckband cuff and fold in half lengthwise with wrong sides together and right sides facing out.

STEP: 31

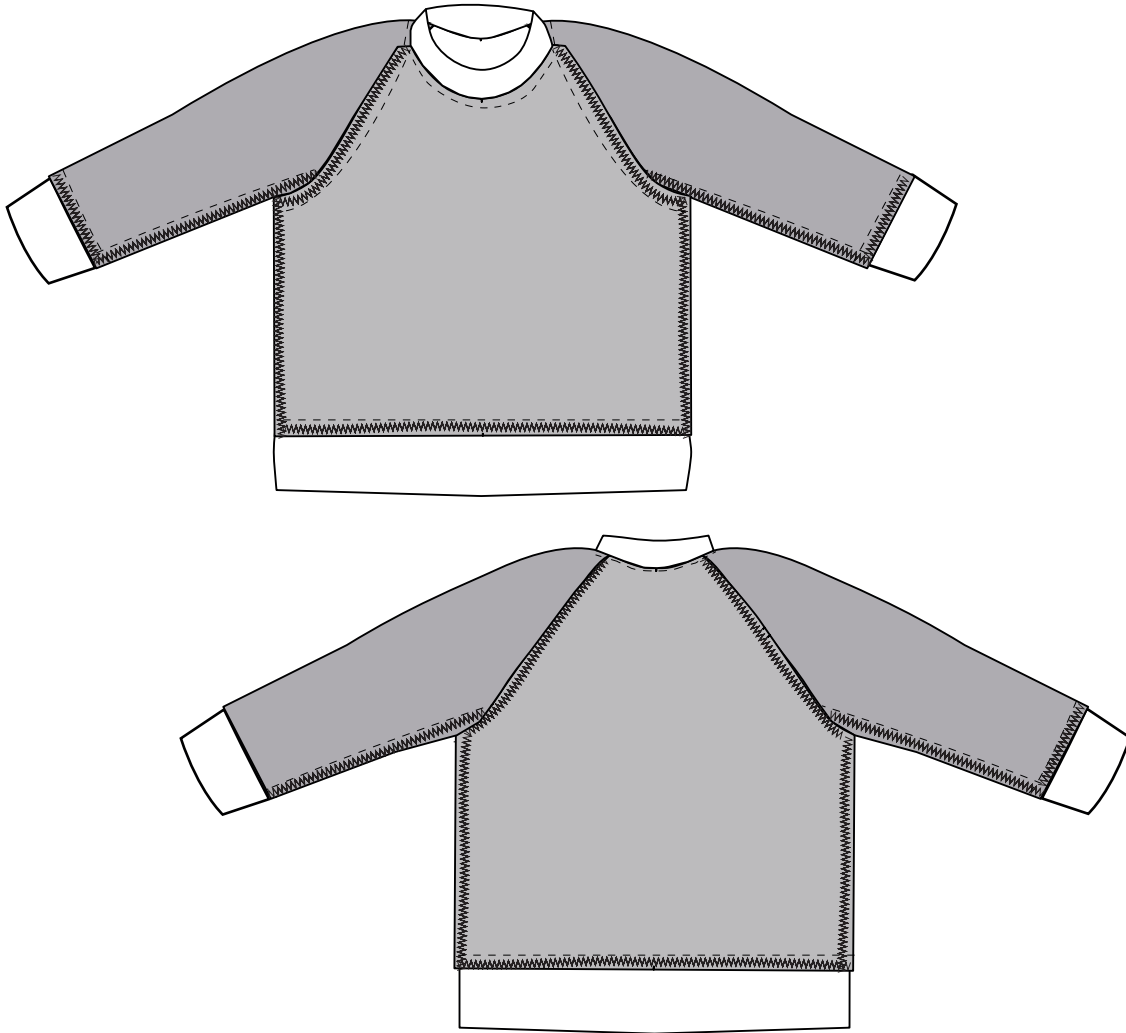
Take the folded neckband and Pin it to the jumper neckline. Matching the seam line junction of neckband with the right back sleeve seam junction. Evenly stretch the neckband to fit the neckline as you are pinning the seams together.



STEP: 32

With a 1cm seam allowance stitch the seams together.

Overlock (serge) or zigzag stitch the raw edges of the seams together to prevent fraying and neaten presentation.



STEP: 33

Turn the completed jumper to the right side out. Whoo hoo! You have now completed sewing.

STEP: 34

Press your garment ready for wearing.

We'd love to see what you made!

Find us on instagram [@futurearchaeology](#) and [@fionabuckingham](#) and tag us with your photos of your creative garments

GLOSSARY

BASTE - Sew temporary stitches to hold pieces in place before sewing permanently. Basting can be done by hand or machine (on a long stitch length). Consider using a contrast thread when basting to make stitches easier to remove later.

BIAS BIND – a narrow strip of fabric cut obliquely and used to bind edges or for decoration. seam finishing, fabric is cut on the bias and attached to the seam for a neater finish

CLIP - Snip into the seam allowance (perpendicular to the raw edge) getting close to the stitch line, to help open up curved seams or corners.

FINISH - Neaten the raw edges of your project using an overlocker, zigzag stitch or binding.

INTERFACING - A (normally) fusible fabric that is used to stiffen fabric, in certain parts of a garment. It is often used in collars, cuffs and button plackets.

NOTCH - A notch is a small cut in the fabric that helps guide you while you are sewing. Notches are used to indicate seam allowance, dart arms, the location of design details or indicate key points on the pattern (like the centre front or centre back). Notches are also used to indicate balance points (points on your pattern that help you sew the right pieces together, as well as help you when you are sewing long or curved seams).

PRESS - Use a hot iron to press seams flat, using steam (if appropriate for your fabric).

RIGHT SIDE (RSU) / WRONG SIDE - The right side of the fabric is the side you would like to see on the outside of the finished garment, while the wrong side is the side that will be hidden inside the garment.

SEAM ALLOWANCE (SA)- The space between the stitching line and the raw edge of the fabric.

TRIM - Cut back a seam allowance to make it easier to manage or less bulky.

UNDERSTITCH - Stitch the seam allowance to a facing or binding, close to the seam edge. This helps the facing roll to the inside of the garment,

FUTURE ARCHAEOLOGY 6.0

Appendix D: Future Archaeology 6.0 – Exhibition Catalogue

Future Archaeology 6.0

Everyone has something to offer.

In the theme of the research thesis, that examine alternative creative strategies I have decided to open up the exhibition artefacts for an open bartering trade system.

Bartering is a non -monetized exchange alternative form of trade.

Each of the finished artefacts within the exhibition is to be 'exchanged' through bartering.

Each item is to be individually offered and is a unique, original and a one off design, the trade accepts the item as is, and without amendments to it.

The artefacts do not have a monetary value attached to it. I encourage you to place your own estimated 'value' and offer a barter trade on the selected item based on your belief, and skills or goods on offer.

Traditional financial / money transaction may be offered but it does not guarantee a winning bid.

The bartering auction will run for the length of the exhibition until Saturday 13th October. The winning 'bid' is at the sole discretion of the exhibiting artist Fiona Buckingham. Winning offers accepted by the artist will be notified via telephone or email on Monday 15th October.

This is not a rejection of current economic models but a broadening of alternative currencies that provide a greater choice for social exchange.

This also encourages an exchange of a needs basis rather than wants.

The digital patterns and e books are not part of the exhibition bartering trade and will be sold separately online through fionabuckingham.com website for a small fee.

Future custom designs from digital patterns will be made available from the website and are between \$300-400 per style or via a bartering exchange upon discussion with the designer fiona buckingham.

All completed garment artefacts and digital files and patterns are copyrighted to the designer fiona buckingham and for individual use only.

The digital patterns or artefacts cannot be reproduced commercially or produced for commercial sale.



Fiona

FUTURE ARCHAEOLOGY 6.0

Exhibition open from October 9th- 13th, 2018
MLC Gallery 5 Eliza Street Newtown, SYDNEY

Future Archaeology 6.0: Exploring the fashion designers practice for the future

There is startling evidence that we now have a waste problem - too much waste, limited resources and the over-consumption of products- in particular, fashion and clothing that is discarded and thrown into the landfill. We are using technology to create faster, bigger, more, cheaper, disposable products. Technological innovation has accelerated the process of designing and selling clothes so that clothes now lack value, creativity, craftsmanship and are designed for obsolescence. Current industry practices have placed pressure on fashion designers to create for price and profit rather than quality, craft or innovation. In an increasingly mobile society and work-force, individuals lack a sense of belonging and attachment to place, things, or culture. People have little connection to the clothing worn and are removed from the manufacture of the products they purchase.

My research thesis critically examines the fashion cycle and supply chain to highlight its inefficiencies and waste, fashion practices and the role of technology in developing fashion and clothing. The research addresses alternative working models and creative strategies that could augur the way toward a more democratic, participatory, and socially conscious industry and enable contemporary fashion designers the relevant skills to become sustainable practitioners in the production of fashion and clothing.

Through practice-based research, I investigated a range of materials and fabrications and explored hand -making techniques, together with digital technologies such as virtual prototyping and 3D printing. A complete set of six patterns were designed and developed in a variety of garment silhouettes for an essential wardrobe. The styles consist of a dress, jumpsuit, pullover, vest, coat and shoe that are designed to be worn over a period of a year; minimising the number of garments purchased during that time. Each pattern is functional addressing a variety of style needs in which several pieces are modular and can be built to form different fashion silhouettes. For example, the dress can be altered to become a top and skirt; and the jumpsuit transforms into a dress.

The modular designs induce participation from the end user in the garment construction process and elicit a stronger relationship between people and their things. Rather than purchasing the styles as completed garments, digital patterns are produced as outcomes. These patterns can be downloaded from the website, at a small cost, and produced on demand, in a variety of fabrications, materials, techniques and surface decorations dependent on the consumers preferences. This process requires designers to relinquish some control over the outcomes of the garments. It exposes the construction process and transfers this knowledge to the end user, disrupting the traditional cycle of the sale and production of fashion clothing and enlisting the consumer as a co-creator and partner in their design and manufacture.

The Future Archaeology 6.0 exhibition showcases a series of experimental artefact outcomes of the digital patterns. Integrating the craft skills of fashion making with the newest of digital technologies it proposes processes that reduce environmental impact, waste and consider both the end user and the entire life cycle of the product. The materials for the artefacts' were not all predetermined, they included discarded, found and unwanted materials, post-consumer waste such as old bed sheets and up-cycled denim jeans, along with materials on hand, and fabrics and garments gifted to me by family and friends. These along with new materials used to re create craftsmanship in clothing and fashion garments that inspire enduring use.



1. Artefact 1: Magyar dress
Materials: top and gathered skirt left over fabric
Composition- viscose
Fabric: Pleated Magyar skirt- fabric gifted
Composition: silk/ linen
Garment Sizing: 10/ Medium



2. Artefact 1: Magyar Denim top
Materials: Found upcycled denim men's shorts
Composition: 100% cotton
Garment sizing: 10/ Medium



3. Artefact 2: Travel suit
Materials: Gifted,
Composition viscose/ silk
Garment sizing: 10/ Medium



4. Artefact 3: Lasercut Jumper short sleeve
Fabric: Found upcycled denim jeans
Composition: 100% cotton
Garment sizing: 10/ Medium



5. Artefact 3: Raglan Denim Jumper
Fabric: Denim found upcycled denim jeans,
Black Left over kyotap season fabric
Garment sizing: 10/ Medium



6. Artefact 3: Raglan Printed Jumper
Materials: Body- left over studio fabric,
Sleeves- gifted
Composition: Body- Printed silk/ cotton,
Sleeves Wool/silk
Garment Sizing: 8/ small



7. Artefact 6: Denim Origami Jacket
Fabric: Gifted denim jeans
Composition: 100% Cotton
Garment sizing: 10/ Medium



8. Artefact 6: Chocolate Origami Jacket
Fabric: front panel- gifted, Body- left over
kyotap range studio fabric
Composition: Panel- wool, Body- Visose, poly,
Spandex
Garment Sizing: 10/ Medium



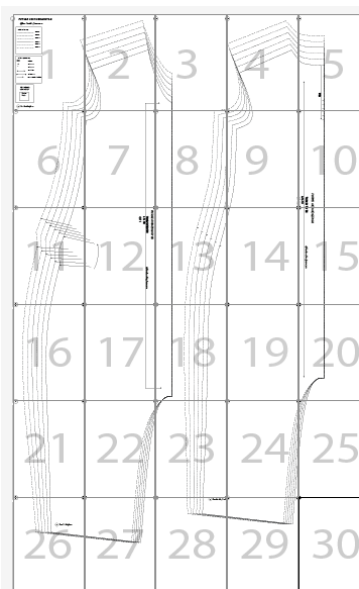
9. Artefact 4: Armour Coil phone bag
Materials: post consumer waste- old bed-sheets, hand dyed with natural dye
Composition: 100% cotton
Garment sizing: small



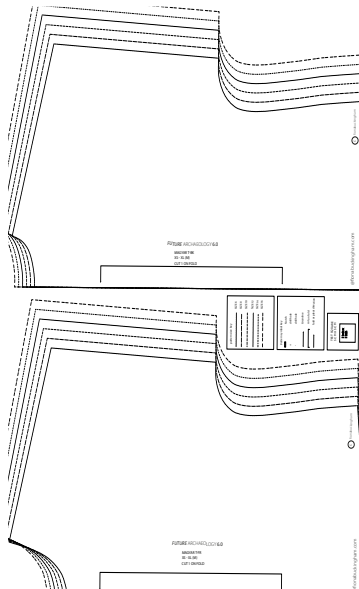
10. Artefact 4: Armour Coil pouch
Materials: post consumer waste- old bed-sheets, hand dyed with natural dye
Composition: 100% cotton
Garment sizing: small



11. Artefact 5: 3D printed shoe prototype
Materials: Plastic
Composition: PLA, nylon resin flexible
Garment sizing: 7
NFS – prototype



12. Artefact 2: Travel suit full -scale digital pattern
Materials: 100gsm paper
Garment sizing: Full grade from 6-16



13. Artefact 1: Magyar Top – Full scale digital pattern
Materials: 80gsm paper
Garment Sizing: Full grade from 6-16



14. Half scale Marquette Series
Artefact 1: Magyar dress
Materials: fabric gifted
Composition: ponti, cotton voile



15. Half scale Marquette Series
Artefact 1 & 6: Magyar dress and Origami Jacket
Materials: fabric gifted
Composition: ponti, cotton voile



16. Half scale Marquette Series
Artefact 1 & 6: Magyar Top
Materials: fabric gifted denim mens jeans
Composition: 100% Cotton



17. Half scale Marquette Series
Artefact 4: Coil Armour top
Materials: post consumer waste- bedsheet
Composition: 100% Cotton



18. Half scale Marquette Series
Artefact 2: Travelsuit
Materials: gifted fabric on hand
Composition: 100% Cotton



19. Half scale Marquette Series
Artefact 6: Origami jacket
Materials: found canvas
Composition: 100% Cotton



20. Artefact 4: ArmourTop
Materials: post consumer waste- bedsheets
Composition: 100% Cotton



21. Artefact 5: Half Scale 3D printed shoe
Materials: Plastic
Composition: flexible nylon
Sizing: Half scale Prototype



22. Artefact 5: Half Scale 3D printed shoe
Materials: Plastic
Composition: PLA
Sizing: Half scale Prototype
Printed on 3D printer Cube 3



23. Artefact 5: Half Scale 3D printed shoe
Materials: Plastic
Composition: PLA
Sizing: Half scale Prototype



24. Artefact 3: Printed Ebook pattern instructions
Materials: left over studio fabric
Sizing A4

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