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## Circular Fashion Archetypes – a Feasibility Study Exploring how Makerspaces Might Support Circular Innovation, within the Context of Fashion and Textiles

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**Keywords:** Circular Economy; Sustainability; Textiles; Fashion; Makerspaces.

**Abstract:** We live in a ‘throwaway and replace’ culture, our growing population and demand for new products has placed huge pressures on our planet’s resources. Our economy is locked into a system in which everything from production to economics and the way people behave favours a linear model of production and consumption, where resources pass through from sourcing to disposal in a ‘take-make-use-dispose’ construct. Climate instability, volatile commodity prices, ocean dead zones, vanishing forests, stalling economic growth, expanding food insecurity and resource conflicts are all part of the resource to waste linear economics (Grayson, 2008). Any of these are surely justifiable reasons to explore a new pattern. This research presents the findings from a feasibility study exploring Redistributed Manufacture (RDM) in Maker Spaces, using these hubs to experiment with new making practices and processes for reusing local textile waste. With the aim cultivating knowledge, skills and capabilities to grow Circular Economy (CE) practices in Scotland. The exploratory method of developing ‘Circular Fashion Archetypes’ is discussed and applied as a practical solution to connect different stakeholders and prototype a local model for a circular supply chain. The insights drawn from this research act as a starting point for future work, reflecting on the implications of the methods applied, concluding the circular economy is the same imperative whether people are focusing on ecology, economy or just their own business. Furthermore, it will suggest that design-led approaches play a role in embedding collaborative ways of working to integrate sustainability into the business modelling process.

### Introduction

This research is responding to the ecological crisis of waste in today’s fashion industry and aims to question conventional approaches, in relation to garment design, production, consumption, use and re-use.

Within a linear system typically, fashion consumers are not aware of the materials or production methods used in the industrial system, nor are they aware of the range of approaches that can be used to extend garment lifetimes (Gwilt, James, 2019). At the same time the mainstream UK fashion system is generally made up of profit-driven businesses that are dependent on a seasonal cycle of producing and on selling large quantities of clothing to meet economic returns. Regardless of whether or not consumers want them, the fashion industry as a whole produce roughly 80 billion new garments annually, made from plastics or

resource-intensive natural fibres like cotton (Fletcher, 2019). If we continue to use materials as we are today, we will need two planets to meet these needs (Meadows and Randers, 2012).

Further research is required to consider how we might dematerialise fashion and textile design practices and lessen our reliance on using new materials, as conventional methods of dealing with these issues have been cited as being symptoms based; they have not addressed continuous and rising consumption levels (Brooks, A., Fletcher, K., Francis, 2018). This clothing is currently designed in response to regularly changing trends that enable quick profit, often becoming obsolete as it is cheaper to buy a new piece than repair or alter an existing garment (Fletcher, 2012).

However, if we want to see changes in the consumption patterns of fashion or the

attitudes among consumers we will have to design systems which includes them and takes their role in the lifecycle of clothing seriously. von Busch claims (2009) we need to create a 'declaration of dependence' between producers and consumers as the production phase is only a very small part of the garment's lifecycle.

This research aims to expand upon several principles of the Circular Economy to explore how designers might play a role in designing out waste and pollution and to identify design-led approaches which endeavour to keep garments and materials in use, which in turn might play a role in the regeneration of natural, social and business systems. Through practice-led research, this paper aims to address the following research question: How might fashion and / or textile designers tackle the issue of material obsolescence by creating Circular Fashion Archetypes to pilot new systems that nurture clothing longevity and support re-use, care and repair?

This research is aligned to a design-led business support programme titled 'Design for Business' - positioned within the V&A Dundee – a Design Museum in Scotland. Design for Business aims to broaden the current remit and focus of design by using Design Thinking methods and approaches, to enable businesses, organisations and even citizens themselves to tackle complex problems, such as the Circular Economy. This paper presents on-going practice-led research that began as a six-month feasibility study titled 'Re-Mantle and Make' (McHattie and Ballie, 2018; McHattie, L. S., & Ballie, J. 2018), funded by a larger project titled 'Future Makerspaces in Redistributed Manufacturing', a two-year research project funded by the Engineering and Physical Sciences Research Council (EPSRC). This research was conducted in partnership with Kalopsia Collective, a micro-manufacturing unit based in Edinburgh, Scotland, with additional in-kind support from several Scottish based textile manufacturers; Johnstons of Elgin, Begg and Company, MYB Textiles and the Scottish Leather Association, who participated within this research project and contributed further by gifting surplus textile waste from their factories.

This paper begins by outlining the current state of fashion, and most recent attempts to shift

towards the industry focus towards circularity in an endeavour to address planetary boundaries. The following sections outline an action research approach to apply 'Circular Fashion Archetypes' as a method, with an aim of lessening our reliance on using precious new materials.

The paper will conclude by reflecting on insights drawn from an emerging network of local, connected and engaged partners, by facilitating opportunities for them to work together as custodians for textile materials, as opposed to users. With a premise of interrogating the concept of the circular economy on a local scale, by using Makerspaces to experiment with redistributed manufacturing (RDM) methods, using high value textile waste sourced from the Scottish textile industry.

## Context

Our planet provides us with an abundance of natural resources. However, with global demand rapidly outstripping supply, the fashion industry cannot continue to operate as it has in the past. As a result, various ethical and environmental issues related to fashion have been at the forefront of public consciousness and debate over the last few decades. More recently, the term 'Circular Economy' (CE) – has come to the forefront of this discussion to re-think how fashion is made, consumed and used. In a CE, the fashion industry, as the Ellen MacArthur Foundation (2017) sees it, should strive to ensure that "... clothes, fabric, and fibres are kept at their highest value during use, and re-enter the economy after use, never ending up as waste." The Make Fashion Circular initiative (2017 – present) steered from the Ellen MacArthur Foundation is bringing together leaders from across the fashion industry, including brands, cities, philanthropists, NGOs, and innovators. Its aim is to stimulate the level of collaboration and innovation necessary to create a new textiles economy, aligned with the principles of the circular economy. Its ambition is to ensure clothes are made from safe and renewable materials, new business models increase their use, and old clothes are turned into new.

This alternative model for a "new textile economy" is intended to sit alongside a linear fashion system that utilizes approaches

focuses on reducing negative impacts, the circular vision for fashion is “... one that is restorative and regenerative by design and provides benefits for business, society, and the environment” (Ellen MacArthur Foundation, 2017, Stahel, W. R. 2016).

Within the UK, the RSA's Great Recovery programme has focused on the role of the design community in delivering a more circular economy. They highlight the importance of acknowledging that it is not the designer's responsibility alone to change whole supply chains and transition to a circular economy entails four fundamental building blocks – materials and product design, new business models, global reverse networks, and enabling conditions (Lewandowski, 2016). Businesses must also begin to develop design briefs around new business models that take account of provenance, longevity, impacts and end of life (Thomas, 2012). Existing business models for the circular economy have limited transferability and there is no comprehensive framework for supporting every kind of company in designing a circular business model (Lewandowski, 2016) and there are very few studies covering, how a circular business model framework should look. Most recently, the Ellen MacArthur Foundation has partnered with world leading design agency IDEO (IDEO, 2019) to develop the 'Circular Design Guide' – a toolkit to explore how design might play a strategic role in supporting circular innovation to support systemic change focusing explicitly on the fashion industry.

This research aims to learn from this ongoing work and expand upon it further to identify what sustainability strategies, innovation tools and business support is required to cultivate Circular Fashion Innovation and to re-think supply and demand on a local scale.

## Methods and Approach

This research followed an Action Research methodology (Coghlan and Brannick, 2014) with methods integrated to support planning, action, observation and reflection. To build iterative approaches using the exploratory method of co-designing 'Circular Fashion Archetypes', the word archetype, is defined as an "original pattern from which copies are made".

Within this study, the premise was to build archetypes collectively, and test them to

understand how they can might be used, to capture emerging insights and further refine each concept. To further explore how they might be implemented within a local circular supply chain designed to operate in a Circular Economy (CE).

With feedback loops designed into each of the research activities, to enable participants to reflect and share learning, to document insights as they emerged. These insights were capturing using a design method - 'Rose, Thorn and Bud (RTB)', and analysed using thematic analysis.

## Research Activity

This feasibility study aimed to address the practicalities for repurposing textile waste within a redistributed manufacturing system (RDM) – supported by local Makerspaces. This was achieved through partnerships with Kalopisa collective and MAKLab in Glasgow who provided access to their facilities, resources and staff.

### *Sourcing High Value Textile Waste*

The Scottish textile sector had previously expressed a growing awareness and responsiveness to circular innovation. This could be credited to the work undertaken by Zero Waste Scotland, who had provided a range of training programs and master classes (Zero Waste Scotland, 2014-18) tailored to demonstrate a wealth of different strategies such as design for modularity, collaborative consumption, zero waste design and pattern cutting and material efficiency (Wilson, 2015).

The workshop participants comprised of; design researchers, product designers, fashion designers, textile designers, Makerspace staff with expertise in digital fabrication tools, manufacturers – both managers and designers, micro manufacturers and citizens.

### *Workshop 1: Building Circular Concepts*

The workshops were designed to facilitate collaboration by providing a platform for previously disconnected stakeholders from across the local textile economy to come together, to explore the complex and systemic issues around textile waste and to identify how they might work together in the future.



**Figure 1. Mapping Circular Fashion Systems.**

The workshop was framed using a design brief – to set the scene and frame a challenge around developing modular circular archetypes for a shift dress. The brief was produced in advance and supported by contextual research and reference materials. This was introduced to the participants ahead of the workshop to enable them to familiarise themselves within the issues. They were asked to adopt the mindset of ‘material custodians’ throughout the workshop.

**The Design Brief: Circular Collar**

“Fashion clothes capture a moment in time and are as quickly forgotten. But what if that moment was not one but many moments... a process of transformation?” (Barley & Fletcher, 2003).

**Design Challenge:** To prototype a circular design concept for a collar that can be worn with existing garments. This project aims to shift our perception of fashion archetypes and the collar needs to be open source, the original conception of a collar can be hacked or modified to produce a hybrid concept. This must apply a modular design approach and consider how to sustain a long-life. The collar will be initially produced within a maker space and this can be used to provide a range of different services to support transformation through workshops or a menu of tailored options.

**Facilities:** 3-D Printer, Digital Textile Printer, Digital Embroidery Machine, hand stitching and embroidery, screen printing, embossing

**Materials:** leather, lace and cashmere



**Figure 2. Circular Archetype Brief.**

The workshop was supported by a design method titled ‘Circular by Design’ (CD) (Ballie and Woods, 2018). This resource was developed as a visual and strategic tool to map circular systems.

The method supports a holistic approach by allowing individuals to work together to explore circularity by mapping different stakeholders across their network and identifying their needs. They framed ‘How Might We?’ questions, this was followed by ideation, to build concept ideas for Circular Archetypes. The purpose was to challenge each individual within the group to adopt a systems thinking view, to consider end of life strategies at the beginning of the design process, and to understand the role and responsibility of each stakeholder across the supply chain. With ultimate goal of sustaining and optimising the flow of materials.

**Workshop 2: Building Circular Fashion Archetypes**

The second workshop was facilitated to focus on making textiles, to explore how Makerspaces facilities could be used to rework these textiles to support Re-Distributed Manufacturing (RDM) methods. The Makerspaces were used as a lab to foster an enabling culture; build local connections; nurturing individual / community capacities; and for stimulating practical application. Throughout this workshop the author / facilitator aimed to unearth everyday ‘how-to’ guidance to interweave circular practices for the local textile economy. Throughout this process, the participants also began to prototype the KIT within a domestic home sewing box by combining digital fabrication tools to provide an extended palette of making options that included; laser cutting, 3D Printing, digital textile printing and digital textile embroidery.



**Figure 3. Re-Distributed Manufacturing Textiles.**



**Figure 4. Building Circular Fashion Archetypes.**

The Circular Archetypes emerged around prototyping a circular system around a simple shift dress, exploring how it could evolve overtime through swapping in and out

accessories that are modular, open source and zero waste. Rather than disposing of clothing once it has served a purpose, might parts be replaced or re-made locally, to enable citizens to re-assemble their garments over and over again, making them last much longer. However, a more, complex and in-depth exploration of patterns and prototypes is required, as opposed to designing and manufacturing regular ready to wear clothing (Karell, 2014).

## Findings

In this research, we see how connecting different stakeholders from across the supply chain is instrumental in supporting circular practices. However, the research unearths many contradictions in the current narrative about circularity in Makerspaces. For instance, the business focus of the CE, and the required Sustainable design strategies will require intensive resource management to implement a RDM system for the local textile economy in Scotland.

To evaluate the study the research team undertook research observations during each workshop and conducted an evaluation using RTB method and analysed the data using thematic analysis. Discussion was facilitated to challenge existing perceptions and prompt conversation around circular innovation to re-think design, production and use. The following insights emerged;

### *Circular Supply Chains*

Throughout the workshops the author/s emphasised the need for creative and participatory methods and approaches to enhance cross-disciplinary, cross-sector awareness and understanding of the need to design for a circular economy. A concern that is frequent voice about the proposition to extend the garment lifetime is that there is no economic incentive for producers to move away from manufacturing large volumes of clothing (Gwilt, James, 2019). However, this small study demonstrates how we might go beyond traditional approaches to manufacturing textiles, further research might work towards textile durability and service design, focusing on offering design solutions for upgrading, repairing or exchanging.

### *Circular Custodians*

The design brief was written to encourage those who participated within each of the workshops to challenge themselves as designers and citizens alike, to re-think new ways of designing. With a focus on developing concepts with 'designer-user' relationships to consider the cultivation of a new approach to consumption in which the user is provided with an opportunity to learn new skills, knowledge, and is motivated to extend the life or use of their clothing. This is a new challenge for industry, business and designers, but also for consumers, who need to critically consider their own consumption practices.

### *The flow of Textiles within Circular Systems*

The feasibility raised further questions about the willingness of businesses to collaborate with both independent designers and makerspaces in the future. Many makerspaces are not financially self-sustainable. There are gaps within circular textile systems and the role of a collector or sorter will be pertinent in the future.

## Conclusion

We have to create a new consciousness towards the use of clothing and introduce new practices for using our clothing longer, maintaining it well, but also investing in a smaller wardrobe with less content. Circular Fashion Archetypes offer an alternative to buying something new, opposed to energy going into creating a new piece, reuse extends the life of these item and cuts down on their carbon footprint. Within the future, the role of the citizen interrogating their own 'fashion footprint' will be essential to understand the narrative of the CE but to in order to engage they require more support.

We also require more examples of circular fashion systems in all scales, from the local and unique to the global and mass-produced. Although the fashion industry proclaims to be innovative and new, the reality is the design, manufacturing and production and consumption processes have remained relatively unchanged since the introduction of ready to wear clothing in the late 1800s (Manlow, 2009). This research endeavoured to learn more about the drivers for cultivating resourcefulness and cherish-ability within fashion and textiles – a term coined by

Chapman (2006), but experimentation was required to identify creative methods through which these approaches could be implemented.

This study provided a different lens through which to view micro-manufacturing from a textile design perspective, with materials sourced from large scale industrial textile manufacturers who service a global fashion industry. While emergent, the Circular Fashion Archetypes provide stimuli to facilitate circular conversations to continue to discuss how we might expand upon the role, skills and capabilities of the designer in the future to equip them to operate within a circular economy.

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