

Urban prototypes: growing local circular cloth economies

Dr Lucy Norris*

Guest Professor of Design Research & Material Culture,

Kunsthochschule Weißensee, Berlin, Germany

*Email: lucy.norris@ucl.ac.uk

Abstract

Circular economy (CE) models are driving the next re-structuring of global textile production and secondary markets, but their socio-political configurations are largely untested. New textile recycling technologies have the potential to redirect material resource flows, disrupt global secondary markets and reconfigure the waste hierarchy. Mainstream CE modelling tends to include people simply as product users in a system of material flows governed by large brands. However, anthropological research into collaborations of small-scale urban designer-producers show how they are using CE principles to prototype new regional cloth economies that aim to re-produce the types of societies they wish to live in.

Keywords:

Circular economy; second-hand clothing; textiles; sustainable fashion; human economy;

Introduction: concepts of the circular economy

This paper takes a critical view on different conceptions of the circular economy (CE) and its potential to enable new ways of living sustainably. Here the focus is on the fashion and clothing sector, in particular current and future configurations of the second-hand clothing (SHC) and textile recycling economies. The field of textiles and fashion is one of the most pertinent arenas in which to explore emerging strategies of sustainability and the circular economy, since textiles and clothing have always been intimately entangled with human social, cultural and political forms.¹ A recent documentary film estimates that up to one in six people on the planet are now involved in textiles and fashion, and claims that it is the world's second most polluting industry after oil.² This growth has been driven since the 1980s by the increasing manufacture and over-consumption of 'fast fashion', enabled by improved integration of supply chains and the shorter lead-times that characterise 'quick response' production, providing a high turnover of cheap clothing in high street stores, and resulting in the related increase in unwanted garments further down the line.³ Fundamental concerns about the industry's negative environmental impacts and poor labour conditions in both production and disposal practices, and its highly visible role in underpinning continued global economic inequality, are increasingly voiced.⁴

The holistic concept of a Circular Economy (CE) is promoted as a solution to the 'sustainability and thrive-ability for both business and planet' - it is systemic by design, close-looped, restorative, waste-free, based on effectiveness and runs on renewable energy.⁵

¹ As a broad spectrum of anthropologists, political economists and textile historians describe; see for example Weiner and Schneider, *Cloth and Human Experience*.; Küchler and Miller, *Clothing as Material Culture*.; Lemire, *Fashion's Favourite*.; Mukerji, *From Graven Images*.

² Morgan, *The True Cost*.

³ see Rivoli, *The Travels of a T-Shirt*.; Norris, 'Introduction: Trade and Transformations'.

⁴ Siegle, *To Die For*.; Brooks, *Clothing Poverty*.; Hoskins, *Stitched Up*.; Greenpeace International, *Toxic Threads*.; Norris, 'The Limits of Ethicality'.

⁵ CIRAIG, 'Circular Economy: A Critical Literature Review of Concepts'.

‘CE supporters portray it as an exciting and whole new way of transforming the economy into a regenerative system that will, as a baseline, exist within planetary limits. This attractive proposition is a social construct which grew out of the sediment layered by many different concepts that have been in existence for some time now’.⁶

The report from the International Reference Centre for the Life Cycle of Products, Processes and Services (CIRAIG) identifies ten concepts that have provided the conceptual building blocks for CE thinking over the past few decades, namely sustainable development, ecological transition, green economy, functional economy, life-cycle thinking, cradle-to-cradle thinking, shared value, industrial ecology, extended producer responsibility and eco-design.

The CE's most active proponent is the Ellen McArthur Foundation (EMF), which was founded to accelerate the global transition to a CE, and in 2014 established *Project Mainstream*, a partnership with the World Economic Forum and McKinsey & Co.⁷ They have published a raft of reports on innovative systems thinking, circulating material streams, intelligent assets, scaling up strategies and regional opportunities within India and the EU.⁸ The best-known diagrammatic iteration of the concept also derives from the EMF,⁹ which shows an industrial system split into biological and technical material cycles, with materials flowing through different feedback loops as the products are, in the technical cycle for example, used, shared, maintained, re-used, re-furbished and effectively recycled.

The move towards a CE requires substantial infrastructural changes in design thinking, materials science and new technologies, industrial production, user engagement, maintenance and reuse markets and waste management. The push towards implementing the CE is growing, following global concerns about resource security,¹⁰ climate change and population growth. The EU has issued an action plan, ‘Closing the Loop’,¹¹ making this a key policy of what is currently the world's largest trading region. CE policies and/or laws are also in place in China, Japan, South Korea, France, Scotland, Canada and the Nordic countries.

The changes that are called for are largely in the areas of industrial production, innovative technologies, and financial and business systems. The EMF and its growing number of global CE100 business partners are strongly attached to the underlying premise that economic growth must be maintained and can be decoupled from resource depletion through designing effective (rather than efficient) systems and harnessing natural capital,¹² rather than championing alternatives to growth such as ‘steady state economics’¹³ or achieving ‘prosperity without growth’.¹⁴ In the US it is also the business case for reducing dependency on scarce external resources and maximising

⁶ Ibid.5.

⁷ ‘Project MainStream Helping Scale The Circular Economy’.

⁸ ‘Circular Economy Reports & Publications From The Ellen MacArthur Foundation’.

⁹ ‘Circular Economy System Diagram - Ellen MacArthur Foundation’.

¹⁰ EEF, ‘Materials for Manufacturing’; McKinsey & Co., ‘Resource Revolution’; McKinsey & Co., ‘Manufacturing the Future’.

¹¹ European Commission, ‘Closing the Loop’.

¹² Ellen MacArthur Foundation, ‘Towards the Circular Economy 1’.

¹³ Daly, *Towards a Steady-State Economy*.

¹⁴ Jackson, *Prosperity Without Growth*.

profits which is driving interest in CE principles, rather than environmental arguments.¹⁵

As the human geographer Hobson observes, these initiatives have tended not to address the socio-political implications of moving towards a CE, have obscured other transformative pathways and practices, and have not considered what forms and processes of governance would facilitate an effective and equitable CE.¹⁶ She asks further, 'what are the implications of a CE for quotidian spaces and practices, as the patterns and rhythms of everyday socio-materiality are potentially reconfigured? ... does [the CE] productively merge disparate discourses and actors to garner much-needed action around the manifold issues of sustainability?'¹⁷ Hobson's paper asks how geographers' approaches to materiality, emergence and everyday activism can engage with CE topics, and investigate the possibilities for citizen engagement and reconfigured material practices around the CE.

Critical thinking that can be brought to bear on mainstream CE models, which assume the power of global capital and regulation to effectively govern a circular system, includes work on the agency of materials whose affordances may prove problematic for attempts to govern their life-cycles, and work on the aims of different socio-political groups who engage with it. Gregson and Crang point out that waste has been primarily identified by the social sciences in terms of the categories and politics of waste management, and defined by waste treatments (disposal technologies or resource recovery strategies) and their connection to policy.¹⁸ Much research on waste is therefore anchored in the idea of humans acting upon the world, in keeping with Latour's critique of the modern dualistic division of the world into the natural and the social.¹⁹ In contrast, an approach to waste that sees it as being 'historically mutable, geographically contingent, and both expressive of social values and sustaining to them'²⁰ draws on Douglas' work on the symbolic nature of the categorisation of certain matters as waste.²¹ This leads Gregson and Crang to ask 'how different matters matter differently?'²² They reference Gille's work on the changing social construction of waste in socialist and post socialist Hungary,²³ and point out the way in which various forms of matter have different affordances and become governed differently under different regimes.

Much CE modelling focuses on material flows stripped of their sociality; people are configured simply as consumers or users that must be encouraged to keep materials circulating through a series of loops, taking little account of the fundamental ontological significance of the relationships between people, materials and things in shaping our world, nor the changing nature of property rights that these entail. In an exhibition celebrating the uncontrollable nature of matter and its unforeseen metabolisms, the accompanying text posits an uncomfortable truth behind the CE:

¹⁵ U.S. Chamber of Commerce Foundation Corporate Citizenship Centre, 'Trash to Treasure'.

¹⁶ Hobson, 'Closing the Loop or Squaring the Circle?', 89.

¹⁷ Hobson, 90.

¹⁸ Gregson and Crang, 'Materiality and Waste'.

¹⁹ Latour, *We Have Never Been Modern*.

²⁰ Gregson and Crang, 'Materiality and Waste', 1027.

²¹ Douglas, *Purity and Danger*.

²² Gregson and Crang, 'Materiality and Waste', 1027.

²³ Gille, *From the Cult of Waste*.

It refers to a logic in which goods are seen as containers for materials that are only temporarily consolidated and will be reclaimed as assets as soon as a product cycle ends. ... Liquid consumption will replace ownership and intermittent access will replace belonging under the pressure of the constant movement demanded by capitalism – a trend that is already foreshadowed by the current “sharing economy”. Goods are rented, loaned and leased rather than owned by the user; goods become services as their assets, the materials that they contain, need to stay ‘in the hands’ of the companies producing them. Accordingly, much of the work of managing materials within circular economic models will be comprised of surveilling the status of these distributed resources through networked technologies – a situation that raises questions about privacy, data management and growing energy consumption.²⁴

There is a wealth of entanglements between people, materials and things that emerge from desires to re-shape our societies and build very different circular economies in the future. These alternative social and political visions of sustainable living in socially embedded economies include people and practices operating in the interface between the market and non-market economies. Examples include the designers, artists and activists exploring the application of concepts such as Open Source to the CE.

Its proponents believe that only by being transparent, sharing knowledge about materials, design principles and technologies can the complex problems posed by transitioning to a CE be solved within the time frames required for action. This knowledge also includes open standards, transparent supply chains, decentralized and distributed collaboration, so that designers and makers can build solutions together. Social activists in Berlin’s new Circular Lab are fighting to change the terms on which material and technical reconfigurations are taking place, and use Open Source principles to foster collaboration and take advantage of the ‘abundance of natural capital’ they are attracting.²⁵ They work to increase the circulation of things, question how much transparency is needed within a system in order to transition to full circularity, to grow social participation, and start by placing people in the centre, creating a form of what Hart terms ‘human economies’.²⁶

Fashion and clothing design is one area where independent designers struggle to gain access to technical information about materials and processes in order to judge their appropriate capacities. The ingredients and properties of materials that achieve certification from the Cradle-to-Cradle Products Innovation Institute, for example, are locked behind a wall of intellectual property rights (IPR) that makes it impossible for such research to be shared. Designers who are permitted to use some of these materials in their projects may find it hard to develop them afterwards, due to the confidentiality agreements in place. And without access to information about the material properties, it becomes impossible to develop the kind of alternative, locally-based, socially-embedded systems envisaged. As independent CE designer and German Sustainability prize-winner Ina Budde commented, ‘the idea is that the CE movement should focus on user flows and not material flows. We need to focus on the product’s worthwhile-ness, its look and feel – [circular] fashion understands this, that value grows through use’.²⁷

²⁴ Buehler, ‘Inflected Objects #2 Circulation - Otherwise, Unhinged’.

²⁵ ‘OSCEdays’.

²⁶ Hart, Laville, and Cattani, *The Human Economy*.

²⁷ Budde, Interview, June 2016.

Fashion hactivists such as Otto von Busch also work with open source principles;²⁸ he encourages us all to share fashion as an open technology of the self, and as a form of civic engagement and community capacity-building. Berlin-based fashion designer and software coder Cecilia Palmer established the upcycling label Pamoyo in 2007 as an open source business that shares patterns with makers under a Creative Commons license. 'The pattern is only an idea, a concept, it only becomes a product when someone actually makes it'.²⁹ She also runs Fashion Reloaded, participatory swap, make and restyle events that use open source tactics to encourage DIY/DIT (Do It Yourself / Do It Together) skills and 'change the fashion game' from the bottom up. Drawing on the philosophy of the maker movement, she says 'if you can't open it, you don't own it! ... this is very easy to do with fashion ... everyone *can* take a pair of scissors to a garment, but not everyone does.'

The next section in this paper outlines the latest and projected developments in textile recycling technologies, second-hand clothing (SHC) markets and CE thinking within the mainstream, large-scale textile and fashion sectors, and suggests that these may affect the future structuring and relative value of these markets by potentially privileging recycling over reuse. By way of contrast, the third section looks at emerging micro-economies of cloth, using a case study from Bristol (UK). This shows how independent young designers and small businesses are working to create meaningful lives and building collaborative production and service models within local economies. These help them to prototype the kinds of CE infrastructures they require to be active participants in re-producing the types of societies and human-centred economies they wish to grow and inhabit.

Textile Recycling and the CE

The circular economy (CE) is rapidly gaining interest amongst the fashion and textile sector globally as a potential systems solution to the challenges of resource vulnerability, traceable and sustainable supply chains, the recovery of materials from users, and the effective recycling of pre- and post-consumer textile waste.

In April 2015, textile up-cycler Cyndi Rhoades, CEO of Worn Again, publically announced that her company was joining forces with H&M and the Kering group (owner of global luxury and sports brands) to speed up development of an innovative chemical recycling technology.³⁰ The recycling of textiles into regenerated fibres, yarns and non-wovens has relied upon mechanical technologies that have changed little since their development 200 years ago and have resulted in a range of very low-quality products.³¹

The current global estimates of used clothing pathways are stark.³² In 2015, about 50 million tons of used clothing was sent to landfill or otherwise disposed of, and

²⁸ von Busch, 'Fashion-Able: Hactivism and Engaged Fashion Design'.

²⁹ Fuad-Luke, Hirscher, and Moebus, 'Open Fashion & Code: Interview with Cecilia Palmer', 189.

³⁰ 'Worn Again Joins Forces with H&M, Kering'.

³¹ Oakdene Hollins Ltd, SATC Ltd., and NIRI Ltd., 'Clothing Recycling Report'; Morley, Bartlett, and McGill, 'Maximising the Reuse and Recycling'; Norris, 'Shoddy Rags and Relief Blankets'.

³² All figures provided in Rhoades, 'Keynote: Materials'.

it is estimated that only 20% of used clothing is collected globally (though this varies widely, with approx. 40% in the UK, 14% in the USA). Of that 20%, 55% is sent to reuse markets, 40% is down-cycled and 5% is waste. There is just a tiny amount of recycling textiles back into textiles.³³ Rhoades declared that she has no interest in disrupting current reuse markets, which she endorsed as environmentally friendly (although this global trade is controversial in terms of the social and economic inequality that underpins it).³⁴ Rather she wants to increase the overall amount of material collected, and develop the technology to maintain the value of those textiles that are then recycled.

The principles of cradle-to-cradle thinking underpin the modelling of the CE in textiles.³⁵ Materials need to be separated into either biodegradable or technical cycles, and products containing inseparable mixtures of the two are 'monstrous hybrids'.³⁶ About 35% of all new textiles worldwide are poly-cotton, and these comprise 75% of the total amount of textiles sent for recycling, currently about 55 million tons. Worn Again's proclaimed breakthroughs in the chemical recycling of old clothing are, first, the ability to separate synthetic polyester from cellulosic cotton in mixed-fibre fabrics through a process of dissolution, allowing each to be extracted and re-processed into new yarn. Polyester can be returned to the granular state and re-introduced into the production cycle.

The second breakthrough concerns the recycling of natural cellulosic fibres, such as cotton and bamboo textile waste. A solution of cellulose can be extruded to create a man-made cellulosic fibre, similar to viscose and lyocell. Through effective recycling, Worn Again aim to create the equivalent of virgin fibres in terms of quality, price and environmental standards. According to Rhoades, the technology will enable a linear supply chain to become circular loops, with consumers urged to become active participants by providing the raw materials back to businesses. The circular business case is (a) a consistent supply of materials (there are already enough used textile materials in existence to re-make a year's supply of new), (b) reduced dependency on external factors such as the weather, oil prices etc, and (c) brands will be able to set very high, but achievable, sustainable goals.

Other consortia are developing related technologies, business models and design

³³ A few well-known closed-loop solutions have been developed over the past few years, which currently rely on returning garments to dedicated recycling factories in single locations. For example, Patagonia's [Common Threads](#) programme enables their fleeces to be recycled by the Japanese company Teijin into polyester filament. [Mud jeans](#), based in Amsterdam, is pioneering the idea of circulating denim, running a leasing scheme for jeans, which can then be turned into sweaters through mechanical yarn reclamation in a factory in Spain. [Dutch aWEARness](#) has created a circular supply chain for its own workwear made from 100% recyclable polyester, Returnity®, which recycles clothing in a factory in Tunisia.

³⁴ The structural impact of the international free-market trade in second-hand clothing on local developing economies has been widely debated, in particular to what extent it conflicts with the aims and scope of international development policies. See Brooks, 'Stretching Global Production Networks'; Norris, 'The Limits of Ethicality'; Norris, 'Introduction: Trade and Transformations'; Hansen, 'Controversies'. The appropriation of second-hand styles as cultural resource are comprehensively discussed in Hansen, *Salaula*.

³⁵ Braungart and McDonough, *Cradle to Cradle*.

³⁶ Braungart and McDonough.

strategies to start 'closing the loop'. Aalto University have partnered with the University of Helsinki to develop IONCELL-F, a sustainable manmade cellulosic fibre that can be made from wood, waste paper and cardboard, and waste cotton textiles. Technical research is investigating the possibility of preserving colour during the recycling, to reduce the need for re-dyeing.³⁷ They are partners in the EU Horizon 2020 consortium project Trash2Cash, as are SOEX, Europe's largest commercial textile recyclers and owners of subsidiary i:Co, the company who works with H&M and other high street brands to collect used clothing in stores across Europe.

One step earlier in the cycle, the Holy Grail for revolutionizing the used textiles economy is the mechanized sorting of used textiles by material to provide the feedstock for this more effective recycling. Fibersort is the fibre-recognition technology being developed by another consortia since 2015, comprising Wieland Textiles, Valvan Baling Systems, Metrohm Applikon, Worn Again, Faritex, Salvation Army ReShare and Circle Economy.³⁸ In order to process the approximately 500 kilotons (kt) of textile waste collected in the UK, Netherlands, Germany, Belgium and France alone, the Valvan machine will need to be able to process large volumes of material quickly to make it commercially viable, while recognising the various material component parts of complex garments.

The successful development and implementation of a coordinated, capital-intensive re-shaping of the technological landscape of textile resource recovery appears to be several years off. However it suggests that there will be profound changes in global SHC and textile recycling markets, as well as an impact on design and primary production. Once such circular systems start to emerge at scale, a key question will be to what extent major brands or consortia operate closed-loop or open systems. In the former, businesses aim to recuperate materials from their own products via leasing models, dedicated take-back schemes and investment in proprietary technology, while in the latter, circular systems are envisaged as operating as an series of open networked platforms coordinating the exchange of resources. The Circle Market, run by Amsterdam-based Circle Economy, is piloting the latter, testing an online European marketplace for post-industrial, pre- and post-consumer recyclable textiles.³⁹ Yet building economic relationships between expensive technologies such as Fibersort and systems such as the Circle Market could result in far more complex models of the interface between open source CE and IPR regimes.

There is the potential for economic tension between sorting used clothing for reuse markets, and sorting for mixed chemical recycling, resulting in a possible privileging of reuse over recycling. The reverse logic of hand sorting heterogeneous garments for reuse markets (largely in developing countries) depends upon highly networked brokers who can obtain stock cheaply and subsidise lower quality goods by reliable mid-market exports and identifying the 'diamonds' that accrue a good profit from the right buyers.⁴⁰ This balance may change if textile recyclers invest in expensive sorting equipment to cope with large volumes of increasingly poor quality fast fashion

³⁷ Niinimäki et al., 'Colours in a Circular Economy'.

³⁸ 'Could FIBERSORT Change the Textiles Recycling Landscape? – Circle Economy'.

³⁹ 'Circle Market: Fuelling the Recovery, Reuse and Resale of Textiles – Circle Economy'.

⁴⁰ Hawley, 'Digging for Diamonds'; Crang et al., 'Rethinking Governance'; Norris, 'Introduction: Trade and Transformations'; Brooks, 'Riches from Rags or Persistent Poverty?'; Abimbola, 'Managing Information Asymmetry'; Botticello, 'Between Classification, Objectification and Perception'; Milgram, 'Activating Frontier Livelihoods'.

destined for recycling – as feedstock for recycling technologies, it may provide a more reliable return. Another factor is likely to be the increasing number of bans and restrictions⁴¹ and proposed bans⁴² on SHC in developing country markets, and the relative precariousness of those import hubs dependent upon serving neighbouring black markets.

In recognition of the potential of circular systems to fully and effectively recover the materials from fast-flowing products and allow for a positive re-framing of 'fast fashion', design researchers at the University of the Arts, London (UAL), as part of Sweden's *Mistra Future Fashion II* programme,⁴³ are working on the principle that the speeds of materials must be matched to user needs,⁴⁴ rather than simply demonising 'fast fashion' and assuming slow is better. Slow fashion is a movement that supports developing deeper emotional ties to clothing, from buying better quality, sustainably produced garments, to maintaining and repairing clothing well and handing it on responsibly afterwards.⁴⁵ All of these are fundamental building blocks of CE thinking and enhance both the longevity of clothing and the social relationships woven into them but do not in themselves ensure the circulation of resources.

A complementary strategy, sustainable 'super-fast fashion' would open up a space for 'short-life' garments made out of renewable resources to be quickly used then recycled, while 'long-life' clothing could be circulated through multiple lives before being reclaimed. Prototypes of the first have included biodegradable *A.S.A.P. (Paper Cloth)*⁴⁶ and the latter through *Fast ReFashion* which enables users to refashion durable garments at home.⁴⁷ UAL's designers are beginning to work with textile technologists to design new materials for the variable speeds of the CE, and with Swedish retailer Fillipa K to develop their in-house leasing and take-back models.

But as the economics of production and re-production of textiles changes, numerous questions arise regarding the temporal, spatial, political and economic character of these new circular economies. Will these systems be locally or regionally based, or organised in global nodes to take advantage of economies of scale and existing textile competencies? Will their locations follow sources of cheap labour⁴⁸ and/or a lack of regulation?⁴⁹ Will these models be dominated by closed-loops where material resources and IPR are protected by global capital, or will materials, services and products circulate via networked open platforms? What will it mean for the cycles of reuse, maintenance and repair that are an integral part of CE thinking – will these services also be kept in-house by multi-national brands, or will a wealth of independent service models develop alongside them? Who will manage the materials and goods that fail to re-circulate?

Crucially, the question remains as to what importance social justice and

⁴¹ International Trade Administration, 'Worn (Used) Clothing'.

⁴² see for example Brooks, 'East Africa's Ban'.

⁴³ 'Mistra Future Fashion'.

⁴⁴ Earley and Goldsworthy, 'Designing for Fast and Slow Circular Fashion Systems'.

⁴⁵ Fletcher, *Craft of Use*.

⁴⁶ Politowicz and Goldsworthy, 'A.S.A.P. (Paper Cloth) - Textile Toolbox'.

⁴⁷ Earley, 'Fast Refashion – Textile Toolbox'.

⁴⁸ Gregson et al., 'Doing the "Dirty Work" of the Green Economy'.

⁴⁹ Crang et al., 'Rethinking Governance'.

economic equality will be given in emerging CE models and their relationship to concepts of global sustainability. As Raworth argues in *Doughnut Economics*, a safe operating space for humanity to thrive in must not exceed the environmental ceiling of limited resources, the planetary boundaries, but must also be founded on a set of social boundaries that prevent human deprivation.⁵⁰

Urban cloth economies

One area in which to explore some of these questions is urban micro-economies, looking at the successes and failures in growing local CEs and their connectivity to both small-scale communities and global business networks. The city is becoming a key site for researching the effective flow of resources; 'regenerative cities' or 'circular cities' are emerging as places with integrated systems, flexibility, cooperative behaviour, localisation, recycling and renewable resources.⁵¹ These concerns resonate with an anthropological interest in infrastructure, broadly described as

technologically-mediated, dynamic forms that continuously produce and transform socio-technical relations. That is, infrastructures are extended material assemblages that generate effects and structure social relations, either through engineered (i.e. planned and purposefully crafted) or non-engineered (i.e. unplanned and emergent) activities. Seen thus, infrastructures are doubly relational due to their simultaneous internal multiplicity and their connective capacities outwards.⁵²

The following is a description of a micro-cloth economy in Bristol. The city was not historically a traditional 'textile town', and lacks the embedded infrastructure required for the large-scale production of cloth or clothing. Nor did it have the associated industries that are found in textile towns for recycling by-products and manufacturing waste. Rather it has attracted a small group of designer-makers and local businesses that are interested in seeing what types of collaborations they can build with the resources they have to hand, and how to fill in the gaps they uncover.

*The Bristol Textile Quarter*⁵³

The south-western city of Bristol in the UK promotes itself as a creative hub of green industries, social entrepreneurs and ethical businesses. With a population of less than half a million, it established its own local currency, the Bristol Pound, in 2012, and was awarded the title of 'European Green Capital' in 2015. It is home to the Soil Association (the organic certification body), the UK's branch of Tridos (the Dutch ethical bank), and Sustrans (which promotes a national cycle network). It is also registered as a Sustainable Food City, developing 'responsible and resilient local and regional food systems'.⁵⁴

In 2014, a small group of independent women in their late 20s and early 30s met at a sustainable fashion conference; they were running their own fashion and textile businesses and were looking for local work space. When part of an old Victorian

⁵⁰ Raworth, *Doughnut Economics*.

⁵¹ 'Circular Cities Network'.

⁵² Harvey, Jensen, and Morita, *Infrastructures and Social Complexity*.

⁵³ The data for this section were largely gathered during a field visit to Bristol in February 2016 and on-going conversations with Harrison, followed up with interviews with Harrison and Hague during winter 2016-17.

⁵⁴ 'Bristol Food Policy Council'.

warehouse became available in the Barton Trading Estate, they moved in together. The 'Bristol Textile Quarter' (BTQ) was established as a collaborative workspace, founded and run by Emma Jane Hague. Having spent five years in an Andean village running a vertically-integrated textile project for women producing high fashion items from local wool, Hague was inspired by both the Textile Arts Centre in Brooklyn, whose mission is to 'unify and empower the local textile community, and advocate for the handmade',⁵⁵ and Made in New York, which supports local manufacturing in the city in partnership with the Pratt Institute.⁵⁶

BTQ's mission is to 'build a more resilient textile economy in Bristol and the South West', and their website challenges:

"if Bristol can think and care so much about how it feeds itself, then why aren't we thinking and caring about how we clothe ourselves too? The vision for Bristol Textile Quarter is to offer both an online platform and a physical space in which the local textile community can start to connect, collaborate and explore what a more resilient local textile economy might look like."⁵⁷

The BTQ occupies most of the lower floor, and membership in early 2016 included costume designer Linda Higginson,⁵⁸ contemporary and vintage upholsterer *A Peculiar Grace*, sustainable clothing label *Tamay & Me* (producing hand-embroidered indigo jackets in Vietnam), Emma Hague's own *Working Wool* initiative and the up-cycled fashion label *Antiform*, founded by Lizzie Harrison. The space offers facilities such as handlooms and knitting machines for hire on a daily or weekly basis, as well as organising events to facilitate collaboration between local makers, designers, fibre producers, students and educators.

Some of the enterprises based at Barton Road are drawing on the rich regional heritage of wool manufacturing in the South-west of England. The *Working Wool* initiative was established by Hague together with *Fernhill Farm*, a holistic eco-farm in the local Mendip Hills who produce *Fernhill Fleece*, to develop an 'immersive learning experience' to raise awareness of wool as a natural, sustainable fibre; the project is now run through the BTQ. The BTQ has also established a South West England affiliate of *Fibershed*, the California-based grassroots movement that supports the development of transparent, regional and regenerative fibre systems, and has been prototyping the production of regionally grown and woven community-supported cloth. This 'soil-to-soil clothing' is part of a movement 'to bridge the gaps between values, technology, the circular economy and people' through a focus on local stories to make these connections visible, putting human values at the forefront of innovation and supporting equitable economies.⁵⁹

The upper floor of the building houses the studio of award-winning designers *Dash + Miller Ltd*, who specialise in the development and production of bespoke hand-woven textiles for the international fashion and interior industries. In 2015, *Dash + Miller* and the BTQ established *The Bristol Weaving Mill Ltd.* at one end of the ground floor, involving one young woman, Leila, spending nine months single-handedly re-

⁵⁵ 'Textile Arts Centre'.

⁵⁶ 'Made in NYC'.

⁵⁷ 'Bristol Textile Quarter'.

⁵⁸ Higginson has documented her challenge to make all of her own clothing in a year at <http://mademywardrobe.com/blog/> accessed 14-6-2017.

⁵⁹ Silvestri, 'Keynote'.

building and re-engineering a salvaged textile loom. Promoted as an artisanal micro-mill based in the heart of Bristol, the equipment has been especially re-built to be as flexible as possible, to produce minimum orders of 5-10m of fabric using a wide range of fibres and weaving techniques including jacquard and dobby, with a 'no-boundaries approach to design and production'.⁶⁰ The mill specialises in producing sustainable, locally sourced woollen cloth and fancy tweed for interiors, as well as a variety of high quality experimental fabrics for women's wear and catwalk fashion, and is producing the first commercial cloth in Bristol for ninety years.

Bristol Cloth

In 2015, a collaborative effort between the Bristol Weaving Mill, Fernhill Farm, the BTQ and Bristol-based natural dyers *Botanical Inks* resulted in a competition to design a Bristol Cloth. Working with a palette of white, pale grey, dark grey and deep mustard, dyed using waste onion skins from local organic restaurants, the cloth would be produced from Fernhill Farm's 100% Shetland wool in a dobby weave. The design brief asked,

- What does Bristol's social fabric look like?
- What kind of cloth does Bristol need?
- How would you weave Bristol?
- What woven designs were traditionally borne out of the South West?

Finalists from the South West had their designs on public show as part of the Bristol Green Capital Lab's events, and the Bristol Cloth partners chose the winner together with a public vote. The successful finalist was Falmouth-based textile designer Wendy Kotenko, with a locally inspired basket-weave design.

BTQ's aim is to make textile and fashion supply chains as local, sustainable and transparent as possible, characteristics of the Slow Fashion movement. Bringing together potential collaborators under one roof, and prototyping Bristol Cloth production, enables designers to find out where the gaps are in processing relatively small quantities locally, and seek out sustainable solutions. Finding spinning facilities in the region that could provide a cost-effective service for the small volumes required (about 30-40kg of fleece at a time), while also being able to ensure no cross-contamination with fibres from elsewhere, was challenging; the raw fibre has to be sent to Yorkshire. If required to be finished, the woven wool cloth is sent North again for the final processing, although it is also perfectly functional (and beautiful) in its 'unfinished' state.

This design and production network has also opened up other opportunities that could incorporate second-hand clothing into a broader aim of founding a regional circular economy, involving designers, users and recyclers. The micro-mill has experimented with using reclaimed yarn for one of its fabrics, and there is potential to use recycled yarns in the future, perhaps eventually derived from local sources of used clothing, as explored in the next section.

⁶⁰ 'The Bristol Weaving Mill'.

Antiform

The label Antiform is a core member of the BTQ, with its founder Lizzie Harrison bringing a different perspective and experience to the collaboration. Until her move to Bristol in 2014, Harrison had co-founded and run a number of clothing and fashion projects in Leeds from 2008-14, challenging ways of thinking about new and used clothing in the broader fashion landscape and community development.⁶¹ She describes her aim at the time as being 'to develop a community-based closed-loop project model for textiles recycling'. Her practice-based research, carried out through the project *ReMade in Leeds*, entailed her choosing to work within a single postcode in a diverse residential neighbourhood in Leeds by setting up a small garment factory in a normal street. Meeting the challenge of how to keep unwanted clothing in circulation locally involved finding new ways to sort, re-direct and re-distribute it. This included encouraging people to turn out their wardrobes and bring forgotten items to the project, setting up a clothes exchange programme, a repair and alteration service, a sewing café offering upskilling classes, fashion hacking events encouraging people to redesign their own clothing, and establishing a social enterprise next door for unemployed local women that upcycled unwanted clothing into new designs for the associated fashion label, *Antiform*. For Harrison, it was all about 'using local skills and undervalued material resources to create local fashion'.⁶²

Harrison's research found that for most of the local community, the act of engaging with fashion was synonymous with going high street shopping and buying something new, while second-hand clothing was sold in very different social settings and hence perceived very differently. A photographic study she conducted with co-founder Jade Whitson-Smith mapped out the local fashion landscape, highlighting the aesthetic differences between the central retail areas of Leeds, characterised by well-lit glass-fronted shops on the high street, and the provision of repair and alteration services, tucked away in run-down premises in residential areas.⁶³ Blurring these differences and establishing community engagement with used, worn and worn-out clothing as fulfilling fashion practice became one of Harrison's central aims.

Much of *ReMade in Leeds*' work was iterative, trialling ideas in as many settings as possible, finding out what worked on the ground and whether the projects or products had viable markets and made a meaningful difference to local populations. Clothes swaps, 'Swishing parties' and online apps are now transforming the circulation and redistribution of unwanted garments around the world, whether the model falls under the umbrella of the 'sharing economy', or through various degrees of monetized exchange facilitated by profit-making platforms. Leeds Community Clothes Exchange is one of the projects Harrison originally founded in her studio in 2007. Inspired by the concept of increasing local resilience by through the Transition Town Movement,⁶⁴ it is now being successfully run by local volunteers. Today it takes place in the local Community Centre, with 1,500 members swapping 2,500 garments every month. Visitors can bring up to 20 garments with them, provided that they are clean and in good condition. In return they get a token for each one, which they can use to simply swap for something else. Any unused tokens are logged in a database for the next visit, or donated to support vulnerable people in the local women's refuge or centre for

⁶¹ Harrison, 'Fashion and Community'.

⁶² Harrison, 247.

⁶³ Whitson-Smith and Harrison, 'Mending Fashion'.

⁶⁴ Hopkins, *The Transition Handbook*.

refugees who need clothing – they can then come along anonymously and pick out what they want.⁶⁵ Homemade cakes and vegetarian Indian food are on offer, and the chance to catch up with friends during the afternoon are some of the biggest attractions.⁶⁶ Swappers who have brought along clothing often meet the other swappers who are acquiring them. Harrison reports that people show a real sense of pride when someone else decides they like a garment enough to take it home with them. It is the conviviality of the occasion and the acknowledgement of each other's taste and judgement that gives it added value for participants.

When ReMade in Leed's repair and alteration service was established, they created a boutique atmosphere. Customers would book an appointment, try on their garment in the fitting room and discuss the repairs or alterations they wanted. When they returned, they would again try on the garment, and if satisfied, it would be wrapped in tissue and put into a bag. The boutique environment also included a café, music, and an atmosphere where people were encouraged to feel as though they were going out with a group of girlfriends on a Saturday afternoon and were expressing their identity through fashion.

Rather than putting herself forward as the designer who needs to take control of the whole system to effect positive change, Harrison sees herself as much as a facilitator and collaborator, who works with whomever and whatever she finds on the ground to re-frame the way in which maintaining and circulating used clothing is perceived as an enjoyable part of the fashion experience, without making people feel that these are worthy practices. Understanding why some approaches fail on the ground has also been an invaluable experience, for example over-ambitious expectations regarding capacities to make the repair of badly designed, cheaply made fast fashion viable. For Harrison, these projects

‘personify the idea of acting locally and offer inclusive and accessible platforms for local communities to participate in fashion events, run fashion services and create new kinds of fashion product. The activities in themselves address sustainability through their very nature... but they also contribute to larger ideas.... around building resilience and creating diversity’.⁶⁷

Harrison is still exploring how to develop appropriate services and spaces to enjoy fashion and the process of re-fashioning, to make these valid fashion experiences for the mainstream consumer. It is this shift, rather than the new recycling technologies that promise to ‘tidy up the mess of over-consumption behind the scenes’, which she believes lies at the heart of the successful development of a circular textile economy.

Growing a circular textile economy in Bristol

These activities take what designer-maker Amy Twigger-Holroyd recently described as the ‘domestic circular economy’⁶⁸ and develops the concepts of community-building and circularity at the level of a city-wide cloth economy, building

⁶⁵ This equitable anonymity is in contrast to other initiatives that focus on asymmetrical exchange when giving a charitable gift, for example the London-based charity Hubbub's scheme whereby mothers package up their babies' outgrown clothing and give them to less well-off mothers at organized meet-ups.

⁶⁶ Zee, ‘Swap till You Drop’.

⁶⁷ Harrison, ‘Fashion and Community’, 249.

⁶⁸ Twigger Holroyd, ‘Shifting Perceptions: The Re-knit Revolution’.

practice-based knowledge about what actually happens to clothing from the initial acts of consumption and clothing's eventual disposal as a base from which to devise appropriate sustainable strategies. As the scope of activity widens, non-market and marginal initiatives increasingly engage with mainstream market-based producers, retailers and recyclers, reinforcing the argument that CE solutions will not be developed in isolation and demand collaboration across economic spheres. It should also be noted that while so many of the 'movers and shakers' of new CE thinking in this article are women, this appears to be so across all sectors, from those leading capital-intensive technological research and innovative high-street retailers through to independent designers, academics, and environmental activists. Gender is highly visible in this sector but it is not obvious how it is being configured in the work to create new economies, and research into the structures of power in the political cultures in which these women are operating would generate useful insights into the challenges that women face and how this impacts upon the roles they develop.⁶⁹

Since relocating to the Bristol Textile Quarter, Harrison has been involved in the development of the Bristol Cloth through design advice, but is already thinking about how to incorporate recycling grades of used local textiles into a fabric run. Of course the textiles and clothing bought and used by local people are not locally produced but are part of highly distributed global assemblages, yet once discarded into the current system they constitute a local material resource for which more sustainable pathways are needed.

Just a quarter of a mile away is the South West of England's largest commercial textile recycling facility, Bristol Textile Recyclers (BTR), employing 70 people, 40 of whom work on the sorting lines. Established in 1972, in early 2016 the family firm was struggling to find commercially viable end markets for the increasing proportion of low-quality clothing; six of their competitors had closed down during the preceding year. BTR bought 20 tons a day (the equivalent of three adult male African elephants as our host Aimee visualized it) but were only able to make a profit on 50% of it, the rest being too poor quality. They buy most of their stock from charity shops and school collections, so their suppliers had already picked out the best quality; yet the top quality 'cream' grades had previously comprised 15% of their stock, before falling to about 1%. As a result, they were only making a profit on the 0.5% which stayed in the UK as a reusable garments, another 0.5% which was sold to Eastern Europe (their buyers accepted only new clothing, preferably with tags), and just half of the 88% that was sold to Africa and Pakistan. A further 8% were recycled as wipers, while the last 4% they had to pay to be recycled by a third party as energy from waste.

Of their export sales, that to Africa was summer clothing: these markets are vulnerable to changing fashions and currency exchange fluctuations, meaning that the high reputation and size appropriateness of used clothing from the UK had to be balanced against possibly cheaper material from the USA. These markets are also vulnerable to the imposition of future bans and restrictions (see above), or conversely the lifting of bans upon which smuggling currently depends.⁷⁰ Much of the winter clothing sent to Pakistan may well end up being recycled for fibre, some is bundled into mixed shipments of shoes and bric-a-brac. Yet there were specific goods for which the firm hadn't a market, for example fleece dressing gowns, which were compacted and

⁶⁹ The multiple strategies women adopt in order to make a living in Berlin's independent creative fashion economy is discussed in McRobbie, *Be Creative* Chapter 5.

⁷⁰ Norris, 'The Limits of Ethicality'.

given to refugees, clothing collections for the Jungle Camp in Calais, or sent to animal shelters for use as bedding. To comply with the EU Waste Framework Directive to recycle 50% of household waste by 2020 and reduce the amount going to landfill, it will become economically impossible for UK recyclers to pay to 'waste' these materials. In an industry known for secrecy, BTR are unusually open about their business challenges, and put a lot of effort into working with local schools and charities to raise awareness of the problems they have recycling low-quality clothing and the potential value of good-quality used textiles. Supporting the principles of slow fashion and re-use, they work with local upcyclers designing from waste, and welcome the public to their premises to buy vintage clothing and to see for themselves the volumes of low-quality clothing that are generated locally.

In the meantime, BTR is placing great hope in the ability of new sorting technologies such as *Fibersort* to become viable as investments, and advances in fibre-to-fibre regeneration to create new recycling markets for its low-quality stock. However, the proximity of BTR to BTQ and their regular networking via regional textile recycling forums opens up the possibility that some of this locally collected material could be incorporated as recycled material into cloth woven in Bristol. This could increase the resilience of the local textile economy by adding diversity of resources to the current mix and demonstrating the potential for closing the loop locally.

The quantities involved are designed to be very small at the outset, and this would not pose a viable circular solution to the problems of mass consumption of fast fashion in our linear system. Yet as a prototype, its most significant value could be in making the connections between these global and local circulations of cloth and clothing visible through a narrative that acts as a new conceptual metaphor. There is a lack of transparency surrounding clothing's production, retail and disposal in the global textile industry's existing linear model, and a lack of knowledge about the materials, technologies and global power relations that underpin it. The prototype as a material representation encourages a re-framing of the way in which fashion and textiles might be perceived to be embedded in the local economy and connected to individual behaviours. Furthermore, the evolution and implementation of local *circular* systems are complex ideas, and their technical and material embodiments can be used as communication tools to improve the next iteration.

George Lakoff's early linguistic work on metaphor showed how it shapes perception,⁷¹ and more recently he asserted that framing is a moral exercise that shapes the character of a political movement.⁷² His work has been adopted by advocates of sustainable third sector development⁷³ and now the CE movement, with the aim of constructing new moral frameworks for sustainable behaviour.⁷⁴ Frame analysis was first developed by Goffman,⁷⁵ and has also been applied to the role of material culture in constructing the contexts of human action in ritual and everyday life, and shaping our expected behaviours accordingly.⁷⁶

Material culture theorists recognise that objects also exert agency through their material biographies and forms. For Appadurai, objects condense experience – they are

⁷¹ Lakoff and Johnson, *Metaphors We Live By*.

⁷² Lakoff, *The ALL NEW Don't Think of an Elephant!*

⁷³ Crompton, 'Common Cause'.

⁷⁴ Lakoff gave a keynote at the online Disruption Innovation Festival 2016
<https://www.thinkdif.co/headliners> accessed 15.1.17.

⁷⁵ Goffman, *Frame Analysis*.

⁷⁶ Miller, 'Materiality: An Introduction'.

icons of other ways of living, they carry their histories within them and exert a demand on us. 'While they are often regarded as tools of fixity, they are in fact testaments of circulation'.⁷⁷ The Bristol Cloth is a complex woven textile constructed from multiple material and social resources, imbued with the spirit of connecting people, creating local urban environments and fostering circularity. It also has potential agency as an artwork: anthropologist Alfred Gell's theory of art suggests that through abduction we infer human intentionality through the agency of artefacts, which become the distributed mind of their creators through their circulation, in turn effecting those with whom they come into contact.⁷⁸ As K uchler contends, this analysis is vital for "recovering the way images serve as the thread of thought, entangling expectations with experience in ways that root agency not in action, but in imagination".⁷⁹

Conclusion

It is suggested that the large-scale technical innovations in the pipeline, driven by consortia whose members are all major stakeholders in the CE, are going to be able to endlessly circulating materials through technologies that will separate out polluted materials and purify them before returning them to the status of 'virgin fibres' ready to be consumed once more. Such technologies ought to empower us to conceive of ourselves as responsible consumers supporting the rituals of separation and sacrifice in order to support the common good, mediated by global business that organises the continued circulation of materials and products behind the scenes, selling us the rights to use certain materials in certain forms for a period of time. In the purest, glossiest representations of this utopian vision, secondary economies could eventually cease to exist, with users simply leasing brand new products until they are ready to be recycled within closed loops and replaced. In this transcendental economy geared towards planetary salvation, now it is not just the domestic household user that redeems themselves through proper moral behaviour, but industry and big business that can grant themselves absolution.

Drawing on Marx's theory of commodity fetishism,⁸⁰ Graeber observes that 'the factory floor and incinerator are just as properly kept out of sight as the hospital ward and crematorium...'.⁸¹ This encourages us to think that objects, like human beings, are 'discrete, free-standing, self-identical entities', rather than 'ongoing processes, patterns of change, fundamentally entangled in the world around them', and it is this that enables us to apply clear property rights to them.⁸² Mainstream models of circular economies operating at the global level introduced at the beginning of this paper, of which a circular fashion economy is a leading example, tend to ignore the constitutive role of exchange in building social relations, focusing simply on the effective circulation of materials and products, and conceiving of people as 'users' in a service economy.⁸³

This paper has briefly referred to alternative forms of sociality and property relations engendered through the shared and redistributive economies,⁸⁴ the open source

⁷⁷ Appadurai, 'The Migration of Objects'.

⁷⁸ Gell, *Art and Agency*.

⁷⁹ K uchler, 'Threads of Thought', 26.

⁸⁰ Marx, *Capital* Chapter 1.

⁸¹ Graeber, 'Afterword: The Apocalypse of Objects', 283.

⁸² Graeber, 280.

⁸³ Norris, 'Clothing in Circulation'.

⁸⁴ Botsman and Rogers, *What's Mine Is Yours*.

movement as a political project that can be applied to varied forms of production and exchange, and acts of repair and maintenance as political interventions. But it also aims to show how CE experimentation at the local community level in Bristol has provided a social and political space in which these approaches, in market and non-market iterations, can come together. Building a local infrastructure of designer-makers and users to grow local capacity makes the work of making and remaking things and the messiness of decay and disposal practices visible, and helps uncover which practices lead to success or failure. It also exposes the types of property relations embedded within clothing during various iterations, the complexity of the value systems through which it circulates as fashion, fabric or fibre, and how it is through the negotiating of exchange from one sphere to another that both economic and social value is created.

As Steven Jackson writes about 'Broken World Thinking', we live in a world characterised as 'on one hand, a fractal world, a centrifugal world, an always-almost-falling-apart world. On the other, a world in constant process of fixing and reinvention, reconfiguring and reassembling into new combinations and new possibilities.'⁸⁵ This paper argues that attention to emergent circular urban cloth economies opens up a complex new site for studying the meanings of cloth in small-scale alternative groups embedded within large-scale capitalist economies, and to understand how the material properties of cloth, its metaphorical role in connecting and tying, and its use to consolidate social relations and mobilize political power, continue to be powerful tools for re-making social worlds.⁸⁶

Acknowledgements

A heartfelt thanks to all of those designers, makers and recyclers who took time out of busy schedules to show me around their businesses, reflect upon their experiences and share their visions for the future of the fashion industry. I am grateful to Susanne K uchler at the Department of Anthropology, UCL for an honorary research fellowship that provided valuable access to library resources, and to Rebecca Earley at Textiles Environment Design, for inviting me to become a Visiting Fellow at the University of Arts London. I would also like to thank the three anonymous reviewers for their helpful comments, and the editors Jennifer Le Zotte and Karen Tranberg Hansen for their overall support.

Notes on Contributor

Lucy Norris is currently Guest Professor of Design Research and Material Culture at Kunsthochschule We iensee, Berlin, and Visiting Fellow at the University of the Arts, London. She is the author of *Recycling Indian Clothing: Global Contexts of Reuse and Value* (2012), and has written extensively about cultural beliefs concerning materials and waste, practices of re-valuing and recycling, and global second-hand textile economies. She is currently researching the role of independent designers in the development of materials and circular fashion strategies.

⁸⁵ Jackson, 'Rethinking Repair', 222.

⁸⁶ Weiner and Schneider, *Cloth and Human Experience*, 2–3.

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