

Circular Fashion 2070: Clothing and Textile Cycles, Systems, and Services



Rebecca Earley is a professor of sustainable fashion textile design and codirector of the Centre for Circular Design, University of the Arts London. Photo credit: Bec O'Conner for Black Neon Digital

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During the covid-19 pandemic in spring 2020, I considered what fashion might look like from the consumer's perspective in 5 years.¹ The “new normal” is changing the way people see the world, and increasing understanding of the role of fashion and clothing in the connected, global, ecological future. This essay takes three garment types and explores how they might be made and used in 50 years' time, drawing on insights from multiple research projects and partnerships at the Centre for Circular Design (CCD).²

Shirts That Last a Lifetime

Working with Research Institutes of Sweden on the Mistra Future Fashion Programme,³ a “super-slow” shirt⁴ was developed to demonstrate how to design clothes that last as long as the materials they are made from (Earley 2019).

¹ The Covid-24 Family Fashion Diary, <https://medium.com/@rebeccaearley/the-covid-24-family-fashion-diary-2f755f6ea585>

² <https://www.circulardesign.org.uk/>

³ <http://mistrafuturefashion.com/>

⁴ “Slow” contrasts with the “fast fashion” that transitions quickly from the catwalk to the mass market.

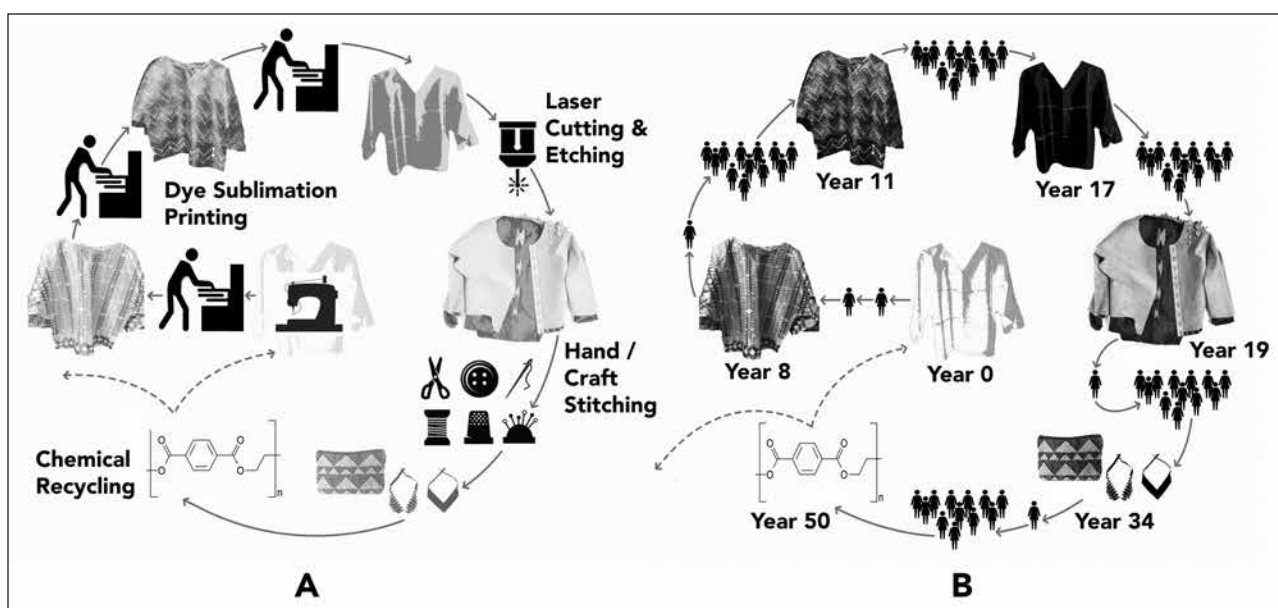


FIGURE 1 How one polyester shirt might last 50 years, get remanufactured multiple times, and be worn by many users. Cycle A shows the remanufacturing techniques that would change the shirt at key stages: digital dye sublimation printing, laser etching and cutting, hand manipulation and embroidery, with the final chemical recycling process taking place at year 50. Cycle B shows different user groups—from single ownership to sharing economy situations—as the shirt changes form and hands over the 50 years.

Polyester is a hugely popular and durable fiber, and in the right conditions can be recycled multiple times, reducing the need to use virgin oil resources.⁵ Service Shirt used recycled polyester material for its first lives as a white then printed blouse, before becoming the lining for a jacket⁶; figure 1 shows its production and use cycles.

Many collaborations and partnerships are needed to achieve such longevity and circularity: the design process itself has many more challenges than the traditional, linear design approach (Earley and Forst 2019). There are multiple barriers for businesses, specifically around “value creation, value delivery, and value capture” (Pederson et al. 2018, p. 308).

Importantly, to make clothes last as long as possible, fashion consumers will need to see themselves as fashion users. They will need both to be persuaded to rent clothes and to develop a philanthropic attitude to fashion by investing in products that have been built to last (and are therefore more expensive than the average item).

A range of new logistical and communication systems and services will also be needed to flow and exchange

the goods. Mending and care services will likely be in greater demand; some people may be willing and able to mend clothes more often, but many will find that with economic and time pressures they want new services. The thrift/charity shop sector will need to be totally redesigned: digitized systems will offer specific and bespoke products to users who have created filtered searches, and will allow online browsing and dispatch goods, after covid-19-inspired deep cleaning.

Dresses That Decompose

An estimated £140 million worth (around 350,000 tonnes) of used clothing goes into UK landfills every year (WRAP 2017),⁷ much of it from unsustainable “fast fashion” brands (Niinimäki et al. 2020). Kay Politowicz and the CCD team have been exploring how fashion cycles might be both fast and sustainable.

Engineering “fast” material cycles to fit very particular fashion consumption habits—where traditional textile production processing is replaced by materials created using paper and packaging technologies, for example—

⁵ According to *Forbes*, “Nearly 70 million barrels of oil are used each year to make the world’s polyester fiber” (Conca 2015).

⁶ A Fifty-Year Fashion Statement (Service Shirt), Circular Design Speeds project, <https://www.circulardesignspeeds.com/>

⁷ In the United States, 11,150,000 tons of textiles ended up in landfills in 2017 (US EPA, Facts and Figures about Materials, Waste, and Recycling, <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data>).

could result in clothes (or parts of clothing) that go into domestic composting processes after use.

Politowicz's ASAP collection in 2012 for VF Corporation tested the approach for a workwear brand (Goldsworthy et al. 2018). Next, by working with material and perception researchers at Innventia in Sweden, also part of the Mistra Future Fashion Programme, Politowicz created the Ultra-Fast Forward, Paper Leather, and Pulp It collections (Goldsworthy et al. 2019), using paper-like nonwoven materials, engineered through nontoxic finishing approaches for softness, strength, and stretch.⁸ Some of the resulting materials underwent double-blind testing with a group of fashion users, and the results came surprisingly close to fine, lightweight cashmere samples (Lindberg and Rådsten Ekman 2019).

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Fashion tastes and habits vary enormously over time; not all clothes can last a lifetime, and “an urgent transition back to ‘slow’ fashion” (Niinimäki et al. 2020, p. 189) might be resisted. Research shows that even when clothes are made well and are highly durable, circumstances mean that they may not be used or worn at all (WRAP 2017).

There are an increasing number of contexts where “better fast” materials could provide options that offer new opportunities to old clothes, to delight consumers rather than making them feel guilty. Fashion textile researchers working with engineers and materials scientists could produce lighter, nontoxic materials, component parts, and whole garments suitable for biological systems.

Jeans That Fall Apart

In 50 years technology will facilitate taking things apart, not just making them. One of the biggest barriers

⁸ Pulp It, Circular Design Speeds project, <https://www.circulardesignspeeds.com/>

to achieving a circular economy for fashion and textiles is sorting and separating materials into the right recycling processes. CCD researchers have been looking at this challenge from different angles, including making textiles, material surfaces, and products that come apart (Forst 2019).

If a pair of jeans could be taken apart at the end of its useful life—the rivets, zippers, and labels easily and efficiently removed, the cotton pocket lining separated from the cotton/elastane-blended legs—these materials could be reused in their own particular way. Startups like the Belgium-based Resortecs are developing smart materials for active disassembly (Chiodo et al. 1998) using a polymer melt thread. They are targeting the denim industry and aim to “have around five ovens and dismantling lines, each dealing with 500–600 kilos of textiles per hour. In five years, we will have 20–30 million denims produced with our stitching thread.”⁹

By 2070 new chemical recycling plants will be linked to sophisticated sorting facilities with textile disassembly ovens. They will be part of regional textile and clothing hubs, where flows are enabled between fiber producers, distributed manufacturing and retail units, consumer and user networks, and end-of-life collection and sorting. It's a very different picture from what exists today and it's where pioneers like Cyndi Rhoades,¹⁰ founder and CEO of cotton and polyester chemical recycling venture Worn Again Technologies, have been building the foundations for change for many years. Rhoades' vision for 2050—presented at the first World Circular Textiles Day, October 8, 2020¹¹—is an industry where no virgin materials are grown or extracted; instead, all fashion materials are made from recycled synthetics and agricultural/biowaste.

Systems Change Ahead

Enough materials have been produced to clothe people for the next 50 years. Land can be used to grow food instead of cotton, and oil left in the ground instead of used to manufacture and transport polyester and other synthetic fabrics.

In the Trash-2-Cash project,¹² the CCD team discovered that this fashion future vision requires *systems*

⁹ Cédric Vanhoeck, founder/CEO of Resortecs, interview by author, June 24, 2020.

¹⁰ Cyndi Rhoades, Worn Again Technologies (<http://wornagain.co.uk>), interview by author, July 9, 2020.

¹¹ <https://www.arts.ac.uk/whats-on/world-textiles-day>

¹² <https://www.trash2cashproject.eu/>

change, driven by pioneering new collaborations. As we explored design-driven material innovation approaches as a diverse group of stakeholders (Tubito et al. 2018), producing six new regenerated material “mastercases,”¹³ we learned that we need face-to-face connections, coupled with an understanding of our skillsets and how they can best be combined to traverse disciplinary boundaries (Earley and Hornbuckle 2017).

Accepting that some people will always want regular “newness” in their wardrobes, regenerative, circular fashion will be needed at a variety of speeds, offered as both product and service. It’s quite a challenge for designers and engineers for the next 50 years.

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¹³ <https://www.trash2cashproject.eu/#/mastercases/>