

CIRCULAR BUSINESS TOOLKIT



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Foreword

"Is it possible to decouple economic growth from negative environmental impacts?"

The transition from a linear to a circular economy requires a systemic approach. This places particular demands on the stakeholders in the system and many questions arise in the process:

How can we use natural resources for products and services while simultaneously preserve the ecosystem?

Is it possible to decouple economic growth from negative environmental impacts?

How can our business model contribute to a system that ensures a good life for everyone, while at the same time remaining within the planetary boundaries?

One way of approaching these questions is to take on a design perspective, exploring and establishing the needs within the system and creating solutions to address them. The challenge lies in managing conflicting goals over the course of the process, which requires a carefully considered strategy and systematic work in order to set the right priorities at every stage.

The purpose of the Circular Business Toolkit is to provide tools for businesses to establish and implement a strategy for circularity that covers business models, product design and material choices, aiming to improve resource efficiency, reduce environmental impact and preserve biodiversity.

The Circular Business Toolkit comprises three components:

- a three-step design process to create a circular strategy and guidelines for product design
- articles providing great examples for inspiration and a deeper understanding
- a digital tool that assists businesses to analyze their current product range and determine potential ways forward

The material is based on results and knowledge accumulated during various projects at Science Park Borås, including re:textile which has explored remanufacture, servitisation and remaking in textiles. Another project is Conditional Design, which was broken down into subprojects that applied and evaluated various aspects of circular design for different purposes. These and other projects form the basis for the inspiring articles and the suggested design process.

We hope this material will be of use to all businesses that are keen to tackle these questions and accelerate their journey towards a circular unsustainable economy.



Adrian Zethraeus
Project Manager
Science Park Borås

PHOTO: MATTIAS BJÖRKEVIK

Introduction

Circular design

The textile industry is a highly resource-intensive sector with a major environmental impact along the whole value chain. One factor is the growing amount of raw materials used for fibre production, which currently stands at around 110 million tonnes per year. This figure represents a doubling over the past 20-25 years, and forecasts for 2030¹ suggest 150 million tonnes. Such resource consumption has major impacts on ecosystems. For example, the production of cotton requires large amounts of water, while polyester is based on the extraction of oil. Furthermore, 80 % of a textile product's environmental impact can be traced back to the production phase, within which the preparation processes in particular account for large amounts of carbon emissions, energy use, as well as water and chemical waste².

Designing for a circular economy means adopting a holistic approach to material use, product design and the business model, in order to create a system that is as resource-efficient and sustainable as possible. Circular design can be defined according to certain principles, as proposed in a report by the expert group for Circular Design Principles, working on behalf of the Swedish Government's advisory body, the Delegation for Circular Economy³ (see illustration on page 6). These principles have been drawn together into a model that links a product's lifecycle (before, during and after use) with four systemic principles for a circular economy:

- Reduce the need for material resources
- Keep products and materials in use
- Design out waste, loss and pollution
- Regenerate natural systems

Science Park Borås has developed approaches and methods for circular design that focus on a range of objectives relating to circularity. However, the variety in approaches might lead to conflicts of interest, and it can be difficult to know what to prioritise. Putting circular design into practice therefore requires an understanding of how best to apply it to different types of products, with reference to their end use, purpose and function. In addition, there is a need for an overarching circularity strategy that enables businesses to navigate towards more sustainable and circular business models, securing value creation from the circular flow to generate profitability. These perspectives are summarised in the model described on the next page.

Conditional Design

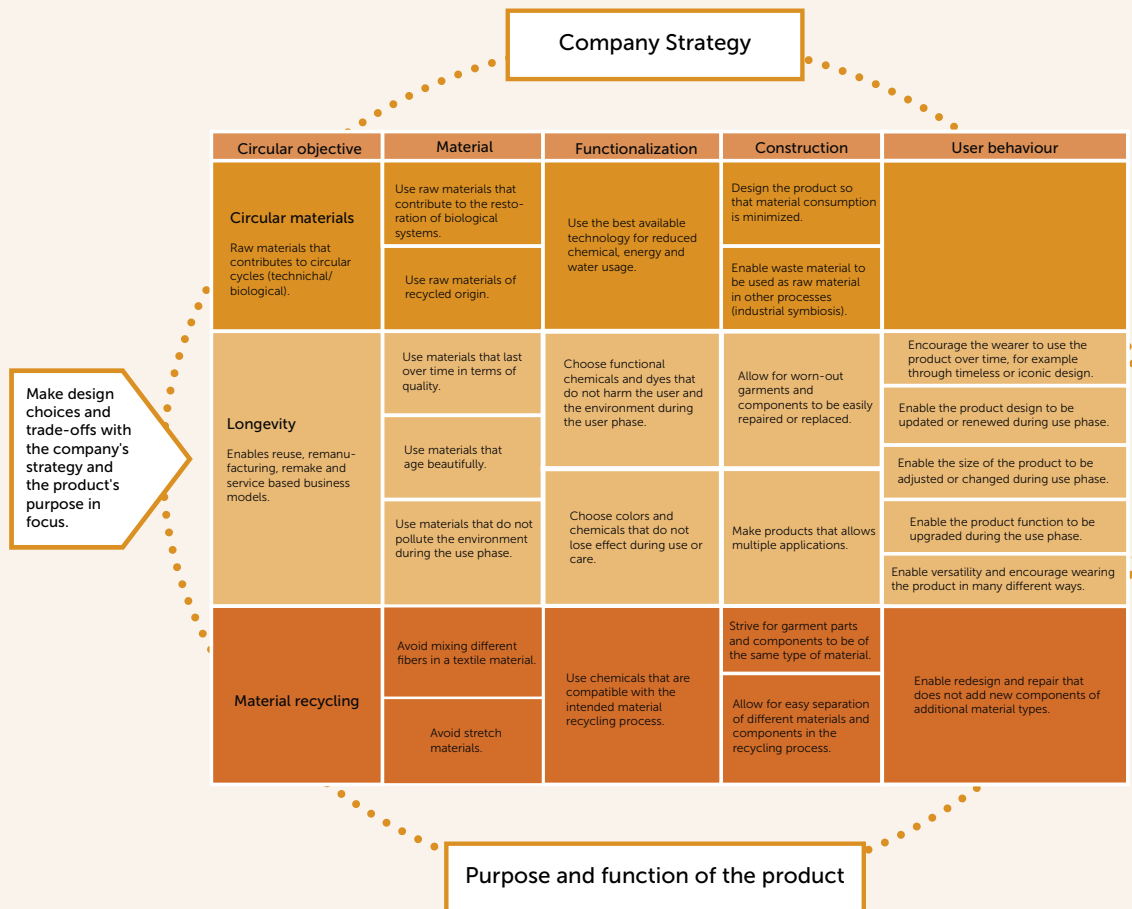
One of the projects at Science Park Borås has involved analysing and redesigning products from different categories, businesses and contexts to suit the circular scenario. This approach, whereby design criteria for circularity and sustainability are merged with original design criteria into one system, is called Conditional Design – a concept that was explored in a preliminary study from 2017 and is inspired by architectural design theories. The project also involved various manufacturers, product developers, buyers and service providers, along with researchers from University of Borås. A feasibility study was conducted to assess the potential for product circularity by investigating the environmental benefits that certain design and material changes can bring without jeopardizing the potential for scalability and profitability.

Based on the results of this project, a three-step design process has been developed to help companies create the right conditions to establish a circular design strategy, serving as a guidance for businesses to set the right priorities. The process takes into account materials, product design, business model, collaboration, and innovation.

¹ Textile Exchange, Preferred Fiber & Materials Market Report, 2021

² Sandin et al, Environmental assessment of Swedish clothing consumption, Mistra Future Fashion, 2019

³ Final report: Expertgruppen för cirkulära designprinciper, Delegationen för Cirkulär Ekonomi, 2020



"However you look at it, a remanufactured or remade product is likely to have major environmental benefits compared to its conventionally manufactured counterpart"

Read more about remaking and remanufacture on pages 46-55.

"Large amounts of collected garments are scrapped or sold for export due to poor quality, leading to unnecessary costs and lost revenue over the garment's lifecycle. Who exactly is responsible for this financial squander?"

Read final reflections on pages 56-58.

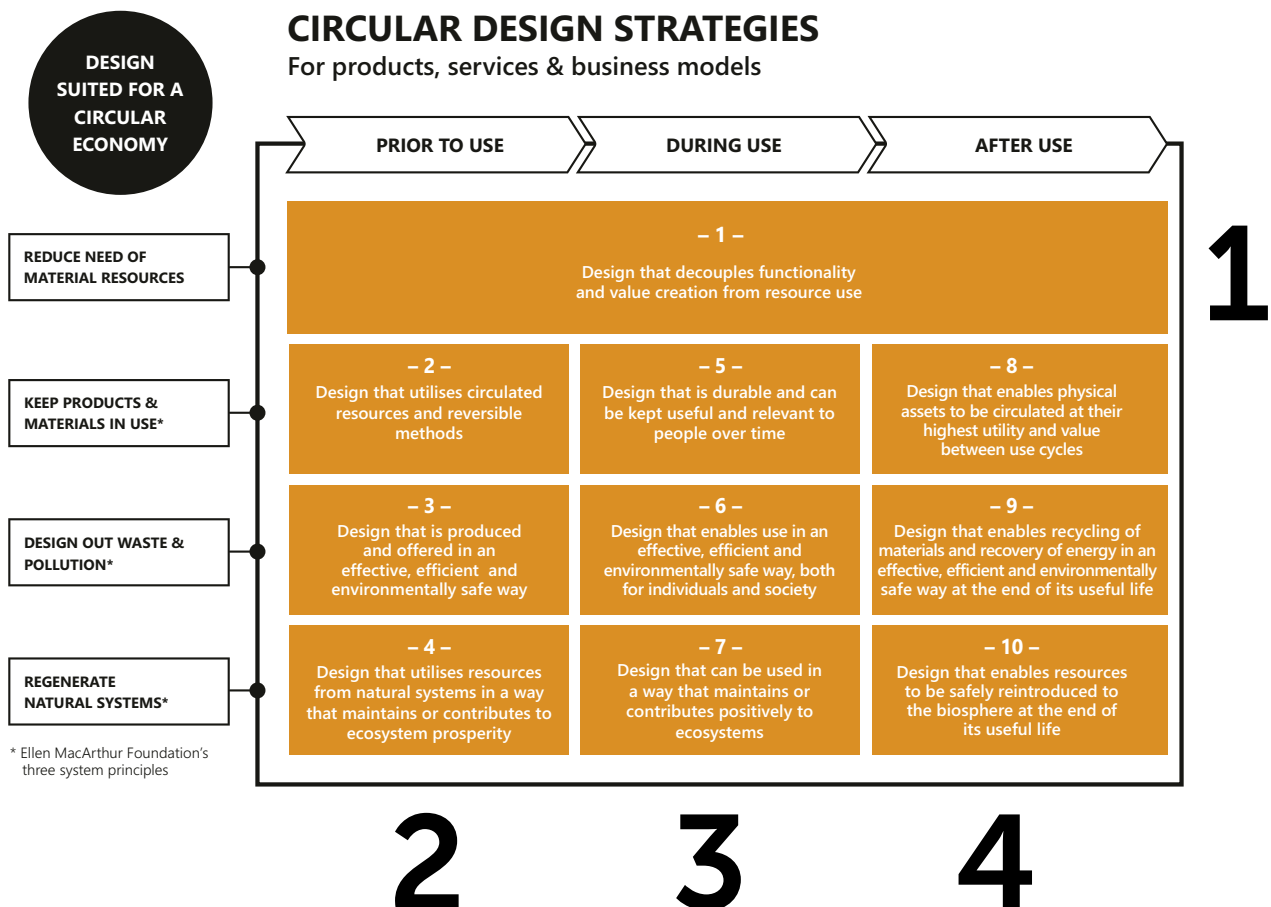


1. Develop a circular strategy

Ensure the right conditions by prioritising and defining a circular strategy

It's crucial for businesses to start at the strategic level to create the right conditions for transitioning to circularity. Using the Circular Design framework and adopting a methodical approach, companies can identify the opportunities for circularity that are best suited to their specific circumstances. This can be done by comparing current business strategies with what is proposed in the Circular Design framework to, in turn, establish a strategy for circularity that suits the company's specific business model². The analysis can be done by answering a number of questions, as listed on the next page.

The final strategy needs to be rooted in the company's mission and core values and driven by the company's passion. There needs to be a clear link between strategy, business model, product development, and material use.



Questions for the strategy work

1. Reduce the need for material resources

- What kind of function/product/service do we offer our customers?
- What does our brand stand for? What are our core values?
- Can the function that our products provide be offered in some other way by developing our business model?
 - Products versus services
- Can we reduce material waste by reviewing our product range?
 - Niche and optimized products versus versatile products and flexible use

2. Before use

- What materials do we use for the products in our current range? Think about the number of products, the proportion of virgin material, recycled material, reused components, surplus material. What are the benefits and downsides of our choice of materials?
- Does our choice of resources/materials match our values, passion and drivers as a company?
- How can we create products with a lower environmental impact along the whole value chain?
- Through our business and our products, can we help to restore ecosystems and generate positive environmental and social effects?

3. During use

- What should the lifecycle of our products look like? How long should the lifecycle of our products be and how do we ensure that this is achieved?
- What is important in our design? What is our DNA in terms of functionality, aesthetic and fit?
- What kind of customers do we have, and what is important in our communication and interaction with them?
- How will it be possible to maintain and improve our products over time?
- Can we offer services that extend the life of our products? Repairs, remaking, upgrading, size adjustments etc.
- How do we ensure that products are safe to use and have a low impact during the use phase?
- Do we provide product maintenance as a service, or do we leave it to the user? Are we missing out on opportunities to create added value by extending product life?
- How do we ensure that our products are toxin free and safe to use?

- Can we offer services that promote sharing and circulation of products and materials among users?
- In which ways can we alleviate the burden our products cause on the environment. Is there a possibility for our products to restore, rather than damage, the ecosystem?

4. After use

- What is the next step when the first customer no longer wants the product?
- Are we part of, or can we contribute to the post-consumer phase of the product? Can we offer services that extend the lives of our products through second-hand, refurbishment, or remake?
- Are there any opportunities for industrial symbiosis related to our discarded material?
- How can we facilitate reuse of our products:
 - Through product design?
 - Through material choice?
 - By improving supply chain transparency?
 - With the appropriate infrastructure for reversed logistics?
- Is it important to us that our products can be returned to the natural ecosystem? How do we ensure this?



**DESIGN
SUITED FOR
A CIRCULAR
ECONOMY**

2. Identify conditions and develop guidelines for product categories

Based on the company's circular strategy, guidelines and methods need to be developed to ensure that the product range abides by the company's circularity goals. These guidelines serve to support design and product development in terms of circularity in order to reach the overarching circularity goals, achieve scalability, and reduce the environmental impacts.

"The aim is to be able to make conscious choices during the product development process, and to understand and own the consequences of the choices made."

These guidelines need to build on the product's original purpose and function, its expression of the company's DNA and how the product's properties create value for the customer. Whether the product is for private consumption or public procurement, the starting point is always the needs of the product's end user, but when designing for circularity, one must also consider the needs from all actors in the life-cycle. It is beneficial to perceive both sorting facilities and recycling companies as customers of your business

A good way for developing guidelines is to answer a set of questions related to the product aimed to be developed. It may also be worthwhile to use a method for visualization, using such aids as descriptions, sketches, images, mood boards and material samples, to gain an overview of quantities, the bigger picture and the details.

Questions to work on

COMPANY

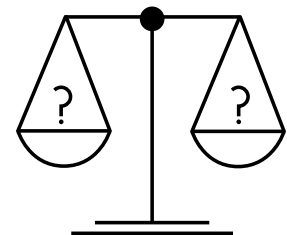
- What are the overall sustainability strategies for the company?
- Describe the company's mission and core values.

PRODUCT'S PURPOSE AND FUNCTION

- What is the purpose of the product?
- Who is the customer? What is important to them?
- What properties and details are essential for the product's practical and aesthetic function?
- What materials are suitable? What opportunities or limitations do these pose from a circular perspective (environmental impact versus lifetime versus recyclability)?
- What function does the product serve within the range? Is there already an existing product that fulfils the same function?
- In what variants (colour-ways, patterns etc.) is the product offered? Are all the variants necessary, looking at the range as a whole?

PRODUCT'S LIFECYCLE

- Describe the product's lifecycle; who is the first customer? What happens during and after the use phase?
- How long does the product last?
- How many washes is it expected to endure?
- How is the product affected by current trends?
- What will it take to ensure a long lifetime of the product?
- How can the product be processed after the use phase? What is the next step?



- Balancing requirements
- Consequences of choice
- Function vs. life cycle vs. footprint

Example of the lifecycle of a circular product.

3. Design for circular flows

Active and conscious choices in the design process can reduce environmental impacts, while also ensuring that the product enables circular flows with improved resource efficiency. Using your own guidelines means that the right priorities can be set for circular design in line with the company's overall strategy.

Design for circular flows within textiles and fashion can be divided into four objectives:

- sustainable resource use,
- long and safe lifetime,
- extended lifetime and reuse,
- remanufacturing and recycling.

Each objective can be achieved through a range of measures in areas such as materials, product design and business model. Designing for circularity automatically involves a systematic approach.

This methodology – making conscious choices and priorities linked to circular goals and based on guidelines rooted in the company's strategy – also means that the design process highlights opportunities for innovation associated with the product, business model, material or other operational areas. This paves the way for a design-driven, systematic and iterative innovation process.

Perspective 1: Sustainable resource use

- Page 11 Goal 1: Use raw materials with better environmental performance compared to conventional materials..
- Page 11 Goal 2: Use raw materials that contribute to circular material cycles.
- Page 14 Goal 3: Use the best available production techniques to reduce energy, water and chemical consumption.
- Page 14 Goal 4: Create the conditions for efficient material use.
- Page 14 Goal 5: Avoid overproduction.

Perspective 2: Long and safe service life

- Page 20 Goal 6: Ensure that the product lasts when used as intended, and that the material's aesthetic condition and function do not deteriorate in normal use.
- Page 20 Goal 7: Ensure that the product does not emit pollutants, such as harmful chemicals or microplastics, during the use phase.
- Page 21 Goal 8: Make it possible for the garment's active lifetime to be extended during the use phase.
- Page 24 Goal 9: Improve the versatility of the garment
- Page 24 Goal 10: Enable a resource-efficient use phase.

Perspective 3: Extended life and reuse

- Page 30 Goal 11: Provide services to extend the lifetime of the product.
- Page 30 Goal 12: Provide replacement parts.
- Page 31 Goal 13: Work proactively to promote reuse of the products.

Perspective 4: Remanufacture and recycling

- Page 42 Goal 14: Design the product to enable disassembly
- Page 42 Goal 15: Facilitate the recovery of valuable materials at the definitive end of the product's service life
- Page 43 Goal 16: Ensure that the product's dyes and functional chemicals do not hinder material recovery.
- Page 43 Goal 17: Work proactively to promote remanufacture and recycling of products that cannot be reused.

Perspective 1: Sustainable resource use

Goal 1:

Use raw materials with better environmental performance compared to conventional materials.

Opportunities

- **Materials:** Use raw material with a lower environmental impact, compared with a conventional raw material considering energy, water and chemical use. Look for independent third party certifications.
- **Innovation:** Contribute to material and process development by funding or participating in innovation projects.

Goal 2:

Use raw materials that contribute to circular material cycles.

Opportunities

- **Materials:** Use materials that promote the regeneration of eco-systems, for example those that comply with the Responsible Wool Standard
- **Materials:** Use materials that can be recycled into new textile materials at the end of the product's life
- **Design:** Avoid intricate textile blends and diverse ranges of materials in products, by exploring innovative design solutions that create the desirable functions with as few different material types as possible.
- **Design:** Explore design solutions that facilitate the separation of different materials and components belonging to different cycles for reuse or recycling.
- **Innovation:** Contribute to material and process development by funding or participating in innovation projects.

REGENERATIVE AGRICULTURE

Regenerative agriculture is based on farming principles that help to restore ecosystems and enhance biodiversity. Alongside organic cultivation, regenerative agriculture is based on crop rotation, use of cover crops and no-till farming methods. This results in a sustainable use of natural resources. Regenerative Organic Alliance is an initiative to create a certificate for regenerative farming practices.

THE SWEDISH WOOL INITIATIVE

The aim of the Swedish Wool Initiative is to lay the groundwork for Swedish brands and suppliers in fashion, outdoor and home furnishings to access high quality Swedish wool. The majority of Swedish wool is currently being discarded. Partners along the whole value chain participate in the project with the aim to minimize the amount of Swedish wool that goes to waste.

The Paper Dress

The Paper Dress project focused on exploring and showcasing circularity from a design perspective with an end result that embodies the best in fashion and innovation. The ambition with the project was to increase the interest in circularity by showing a bold showpiece in an unexpected material and technique, with a non-conventional usage.

This ambition is achieved by creating a standout garment based on circular design principles, demonstrating that sustainable design and stunning looks can go hand in hand. It is worth noting that such circular design approaches remain uncommon in couture practice. Employing circular principles in such a way is primarily about making a statement in the effort to change existing norms and practices.

The work began with a workshop to assess circular design strategies and methods, and the decision was taken to employ fashion designer Stina Randestad's specific design method, which involves combining elastic and stiff materials to create the form and look. An interesting language arises in the interplay between the static and the organic, creating a design that is sculptural but still wearable. The dress is deliberately made of paper thread and cardboard, which are both made from the monomaterial paper and therefore suited for circular loops.

Being able to recycle a garment in its entirety simplifies the recycling process, as the garment does not need to be separated into different material components. The concept of creating a circular showpiece dress in paper shows consumers that even the more unconventional garments can shine despite being made of modest monomaterials. Paper thread is made from narrow strips of paper that are spun into a yarn. The thread is delicate due to its stiff and structured nature, and can only be used in an industrial knitting machine if that machine is run slowly and not too much tension is applied to the thread.

The circular concept also informs the life of the paper dress as a showpiece. It is common for a designer to lend or rent out showpiece garments to exhibitions and stylists for a limited time, exposing the garment to considerable wear and tear in the form of dirt and damage. Since the material

combination and design make laundering impossible, wear and dirt are seen as an opportunity to change the garment in the future. The white dress can be dyed darker bit by bit until it eventually turns completely dark

Dyeing or painting the dress also means that it is constantly evolving, showing that garments can evolve aesthetically during its lifetime. The change in colour can also generate further attention, as the first version, in pure white, cannot be borrowed at a later stage because it has been coloured red, for example. Constant change creates a potential sense

STRENGTHS	Exciting and innovative material	WEAKNESSES	Fragile garment
	Holistic approach to sustainability and circularity		Limited market
OPPORTUNITIES	High artistic take on circularity	THREATS	Recycling technology is currently not available for this material
	Challenging the convention of how we look at fashion and consumption		Unclear short-term environmental benefit
	Fashion design as an exploratory and experimental ongoing process to find new opportunities linked to sustainability and circularity		
	Material development of bio-based materials with better performance		

SOURCE:: CONDITIONAL DESIGN: FINAL REPORT, SCIENCE PARK, BORÅS 2022

of urgency or curiosity about what is coming next. For example, stylists/photographers may want to borrow the dress at a specific stage of colour development or wait for a future colourway.

Potential value/benefits

Environment - Monomaterials facilitate easier and more efficient recycling. The dress was designed with circularity in mind, and its ability to transform allows the use phase to be extended. A longer usage phase could potentially lower the amount of garments needed, as the period of use per garment increases.

Customer/society - Prioritizing circularity already at the design phase opens up the possibility of new, more eco-friendly ways of working. Customers gain the added value of knowing that what they are buying or renting has been designed and produced with circularity in mind. In this example of the paper dress, the circularity aspect adds extra value, as the garment can be changed throughout its lifetime.

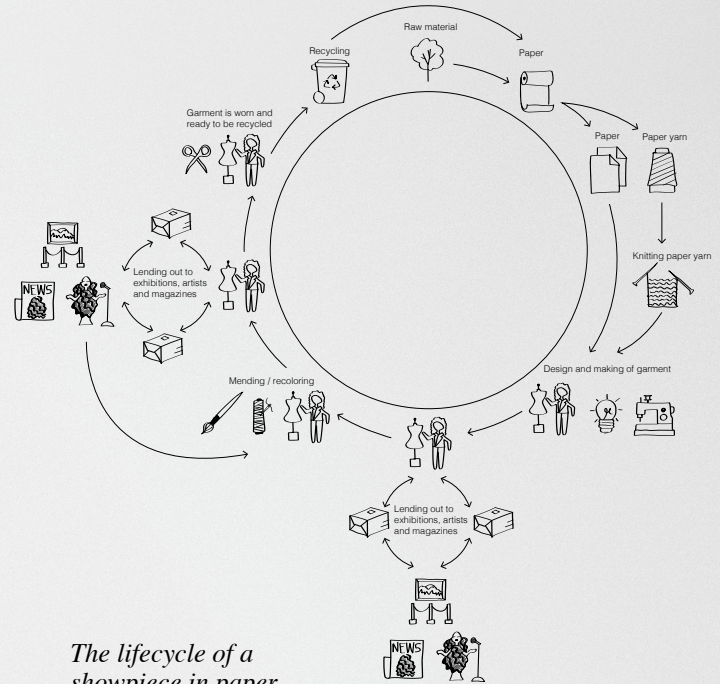


PHOTO: JACOBO CAMPOS
PROJECT: THE PAPER DRESS



*Goal 3:**Use the best available production techniques to reduce energy, water and chemical consumption.***Opportunities**

- **Production:** Ensure that production is powered by renewable energy and uses more energy-efficient production techniques.
- **Production:** Use dyeing and preparation processes that require lower amounts of water.
- **Production:** Use production techniques that involve fewer chemicals and make chemical use more efficient.

*Goal 4:**Create the conditions for efficient material use.***Opportunities**

- **Design:** Design garments for minimal material use without compromising their functionality
- **Production:** Promote industrial symbiosis by using residual material as a raw material in new processes.

*Goal 5:**Avoid overproduction.***Opportunities**

- **Range:** Review the product range to avoid similar models and variants.
- **Production:** Review procedures and systems for production planning and stock control to minimise overproduction.
- **Business model:** Develop a model for demand-driven production.
- **Business model:** Develop internal systems and procedures for activating deadstock.

IMOGO

Imogo is an innovative dyeing technique that reduces the amount of water, chemicals and energy used, compared with conventional dyeing. The technique involves spraying the dye onto the material instead of using the traditional water bath.

STUDIO HEIJNE

Studio Heijne is a Stockholm-based design studio that offers customizable made-to-order garments, aiming to create a unique customer experience while minimizing overproduction.

PHOTO: ELVINE



Digimode

The Digimode project focuses on the potential of using digital technology and virtual solutions, not just for the product development phase or marketing purposes, but for the textile industry as a whole. While more technology is gradually being introduced into the textile value chain, very few companies have gone all the way, despite research showing that there are numerous benefits.

Ordinary Swedish fashion companies buy garments and other products with long lead times, usually overseas. This makes sustainability more difficult to achieve and can result in a lower level of sell-through. Online retailers also struggle with high return rates due to fitting and sizing issues. This can be resolved using modern technology, and the Digimode project shows how technology can be integrated into a new system.

Digimode sought to improve virtual design and e-commerce using digital solutions to promote both local production and customer relationships. It achieved this by digitalizing previously manually driven parts of design and marketing processes, as well as the e-commerce platform. Such solutions eliminate over or under-production, reduces the number of returns, and makes the shopping experience more immersive.

Commercially available cutting-edge technology was used to create a demonstrator made up of two parts, with a cloud-based connection. One part contained the virtual design process and the sales technology, while the other dealt with the local, demand-driven production. Based on the individual order data, the products were created locally and then delivered directly to the customer within just a few days. When it came to summing up the project, all the partners agreed that it had worked satisfactorily and had been an interesting project in which to be involved. The project was also rewarding and informative, with everyone very positive about continuing the project or taking part in other similar projects.

It is key to retain a balance between the degree of customizability and lead time. Having more options increases the chance that the fit will be as individually tailored as possible,

but at the same time it increases the complexity of the programming and the customer's ordering process. Time must also be invested in training staff to guide customers through the process, so they are not put off the purchase by an overwhelming array of choices. As with most personalised products, the garment cannot be returned, which was something the majority of customers wanted. There was considerable interest in personalising the look

STRENGTHS	Innovative technology creates interest	Requires new customer behaviours	WEAKNESSES
	Short lead-times	System requires technical integration	
	Local production	High-cost production	
	Demand driven production reduces risk of dead stock		
	High service level		
OPPORTUNITIES	Local production create work opportunities	Premium price product	THREATS
	Access to customer measurements increase knowledge	Difficult to change customer behaviour	
	Explore new service based business model	Requires new competences	

SOURCE: DIGIMODE FINAL REPORT, UNIVERSITY OF BORÅS, 2017

and fit of the garment, and the majority of those surveyed would recommend the service to a friend. The 25 % price hike was deemed reasonable by customers given the garment's position in a higher-end segment.

The compatibility and infrastructure between the systems is complex. Configuring all the systems so they read and communicate with each other requires new technology. The project pointed at the necessity of automation to minimize costs. The lack of compatibility between platforms demanded many instances of manual intervention. Since the project concluded, the technology has been improved and integration of the two parts is now supported. There are huge opportunities for online retailers to market new technology and to pave the way for local production and innovative business models.

Create your avatar

The first step is to create a model of your body to fit the garment on. If you don't have your measurements, you can just input your length and body type.

Gender

Male / Female

BodyType

How to measure

Adjust measurements

Body Length 191

Arm Length 92

Chest 104

Waist 92

Hips 107

Looks like you now?

Continue

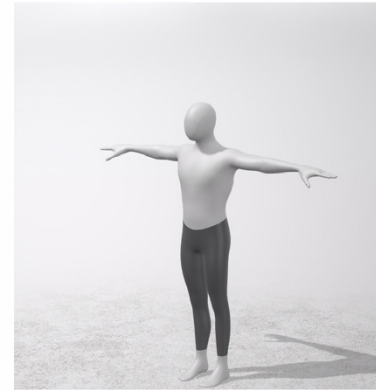
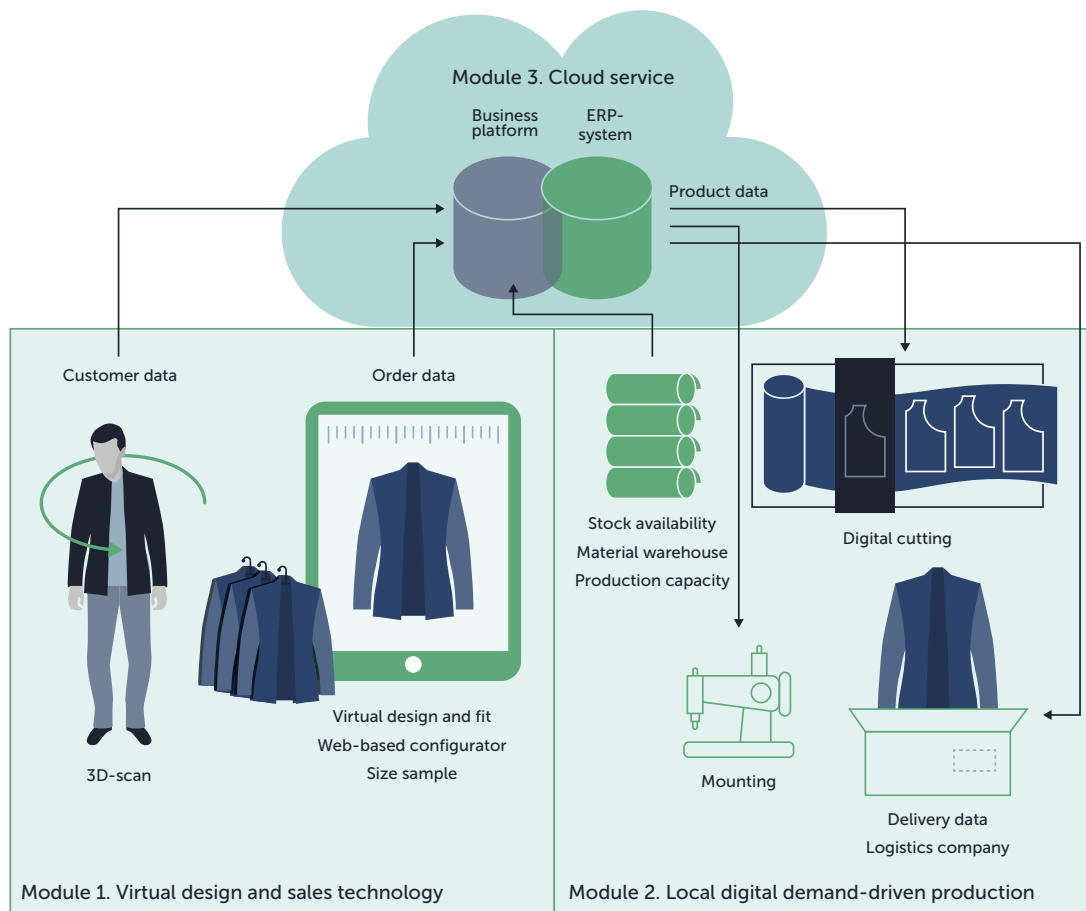


PHOTO: SCIENCE PARK BORAS
PROJECT: DIGIMODE



Description of a digitalized system for demand-driven local production.

Potential value/benefits

Environment - Material use can be reduced significantly by manufacturing on the basis of demand rather than stock. This also reduces the number of garments that risk having to be disposed of in sales or gathering in piles, unsold. Switching to individually customised products drastically reduces return rates due to poor fit.

Customer/society - Short lead times and lower prototype costs result in a well-priced and unique product for the customer. There is no risk of the products running out, assuming that the material is available. Data collected from customer measurements can guide/supports the design process in its continuous striving for a better fit. Local manufacturing creates more local jobs.

Knit-on-demand

“Is it possible to deliver knitted garments in custom sizes directly to customers in-store?” This was a question that led the Swedish School of Textiles and Ivanhoe AB to develop a new concept in a pilot project together with SOMconcept, a company that intends to provide “Ethically and morally sound customized clothes, whenever you want them”.

The concept store aimed to provide a personal customer experience able to deliver tailor-made clothes without relying on/maintaining a stock. The garments were manufactured at Ivanhoe’s factory in Gällstad, which offered shorter lead times and smooth production, but involved a higher production cost than mass-production in factories abroad.

The concept was all about granting the customer the ability to design his/her own garment with the freedom to choose fit, color, and other design aspects. The customers were to wait one to three weeks before receiving them. To hit the balance between production feasibility and design freedom, a module-based approach was used, granting customers to combine various design elements however they wanted. They were free to choose and combine the design however they wanted, based...

The success of knit-on-demand rested on the ability to efficiently produce and deliver garments while sacrificing as little personalization possibilities as possible. The module-based strategy for design and production that emerged from the project was established in collaboration with Ivanhoe AB and SOMconcept. The strategies for design and production of the personalized garments were developed jointly with the two project partners, Ivanhoe AB and SOMconcept.

Several workshops were held with potential customers to develop a concept that could easily be navigated by the customer and meet their expectations about the garment within the parameters of the project. The initial idea to acquire a knitting machine and place it in-store, but the cost of this was considered to be too great a risk. The actual production time for a personalized knitted garment is around three hours.

If the machine would have been placed in-store, it would have been possible hand the garment directly. With production based in Gällstad and the store in Stockholm, one-week lead time seemed reasonable on both the manufacturer’s and customer’s part.



SOURCE: LARSSON, J. CUSTOMER PERSPECTIVES ON MASS-CUSTOMIZED KNITWEAR, UNIVERSITY OF BORÅS 2012



Illustration of components in the Knit-on-demand system.

Potential value/benefits

Environment - Make-to-order solutions such as this reduce overproduction because it avoids the necessity to forecast and maintain stock. It also reduces resource use. A win-win for the environment

Customer/society - Engaging the customer in the design process increases their sentimental bond with the garment, making it more likely they will keep and take care of it. The customer also gets a unique garment with a personal fit. In addition, the concept promotes local production, which creates jobs and ensures good labour standards.

Critical success factors

To attain high levels of customer satisfaction, the visualization tool has to be able to render an as accurate representation of the real garment as possible.

Few suppliers can implement demand-driven production without making major changes to their current operations, nevertheless, the benefits are significant, and risks are relatively low enough to warrant consideration among businesses.

Perspective 2: Long and safe service life

Goal 6:

Ensure that the product lasts when used as intended, and that the material's aesthetic condition and function do not deteriorate with normal use – e.g. in terms of strength, durability, wear, colourfastness, pilling, wash resistance or water repellency.

Opportunities

- **Materials:** Use material with the right properties for the intended purpose (durability, colourfastness, wash resistance etc).
- **Design:** Reinforce or design out weaknesses, for example by designing the garment to avoid pilling.
- **Design:** Ensure that the product's design appeal will last, so the garment remains in use for a long time – e.g. timeless or iconic design.
- **Business model:** Explore the possibility of offering services for restoring condition and function.
- **Communication:** Share knowledge and inspiration on how the customer can repair or restore the products by themselves.

Goal 7:

Ensure that the product does not emit pollutants, such as harmful chemicals or microplastics, during the use phase.

Opportunities

- **Materials:** Use materials that don't emit pollutants when used – e.g. via standard 100 by OEKO-TEX.
- **Production:** Employ production processes that minimize pollution during use.
- **Innovation:** Contribute to material development by funding or participating in innovation projects.

RE:SET – RESTORING DEFECTIVE GARMENTS

The aim of this project is to develop innovative processes for restoring aesthetic and functional qualities to garments using industrial processes to remove pilling and stains or restore the shape.

MICROPLASTIC SHEDDING FROM POLYESTER CLOTHING

A 2018 report from the research body Mistra Future Fashion examined how microplastics are shed from textiles made of polyester fibre. Preliminary results showed that the shedding can be reduced by (1) switching to ultra-sound technology for cutting and sewing, (2) avoid brushing the surface of the fabric and (3) removing microparticles from the surface of the fabric in the production process.

Goal 8:

Enable the garment's active lifetime to be extended during the usage phase, for example by making the size adjustable.

Opportunities

- **Design:** Design garments in flexible and adaptive sizes and fits.
- **Design:** Design garments that allow users to change their sizes during the use phase, for example making extendable children's wear or by using generous seam allowance in relevant places.
- **Materials:** Enable functions to be restored – e.g. water-proofing.

GROWING CLOTHING

Petit Pli is a London-based material technology firm that, inspired by satellite technology, offers children's clothing in adjustable sizes, aiming to reduce the need for new clothes and thereby reduce the environmental impact of the industry. The idea is that the garment grows with the child.

ADAPTIVE SIZING

Swedish start-up Nano Textile Solutions has developed an innovation for adaptable sizes in textile products. The technology allows for panels with flexible shapes and fixing positions to be inserted in products and enable a personalized and adjustable fit. Prototypes have been developed for applications such as workwear or boots, where leg length and shaft width can be adjusted so the same product fits more wearers.

Circular design

Region Västra Götaland

Region Västra Götaland has joined forces with Science Park Borås and the University of Borås on a project focusing on the sustainability and quality of workwear in healthcare. Region Västra Götaland's aim is to increase the amount of sustainable textiles in operation and to extend the service life of garments already in use. Extending the service life of garments is one of the core principles of circularity. The region reportedly discards large amounts of textiles and receive remarks from staff regarding quality and fit issues on workwear garments.

The project found that the garments faced quality issues, which resulted in short use phases. This consequently carried negative implications in terms of sustainability. There was a lack of clarity in the quality specification of the workwear ordered and produced. There is room for improvement when it comes to communication and specifications in the attempt to raise quality levels.

The products covered in the project were three kinds of workwear, specifically designed for people working in healthcare: a pair of elasticated ankle trousers, a more classic trouser design and a body warmer. The garments are designed to be comfortable, with a loose cut to allow good movement, and they work for both women and men. Made from a polyester-cotton blend, they have to meet strict quality and hygiene standards, as well as endure industrial laundering.

The project moved on to develop and improve the products, following three different scenarios. The first scenario analysed the current situation and improvements were suggested, based on current specifications and standards. The second scenario involved generating a new design for the garments, based on a questionnaire completed by the users. Finally, a new design and construction were developed based on an imaginary future scenario, drawing on the user questionnaire and the quality contributions from the laundry firm.

Scenario one highlighted a lack of clarity in the specification of requirements as a contributing factor to the quality issues.

An initial step is therefore to clarify and verify that the products comply with current standards. The set requirements need to be clear and monitored consistently. The next step is to ensure the quality of the tests carried out by the fabric supplier and to appoint one of them, so the same supplier delivers to all the sewing factories.



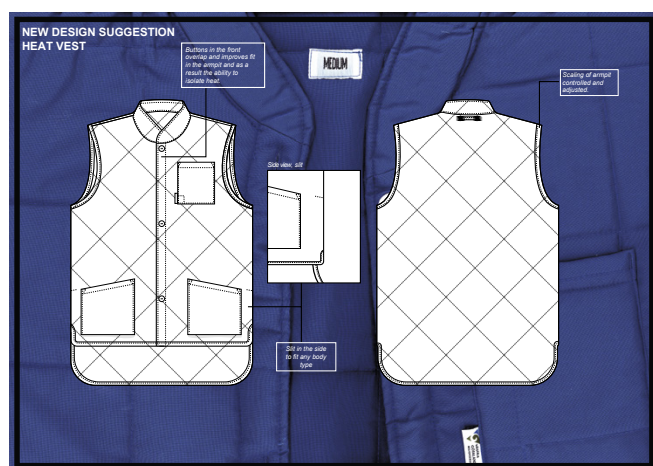
SOURCE: CONDITIONAL DESIGN: FINAL REPORT, SCIENCE PARK BORÅS, 2022

In scenario two, a new design was drawn up for the three garments, based on user data collected from questionnaires and product quality information from the laundry firm. The design changes primarily sought to extend the service life as well as fit and functionality of the garments.

In the third scenario, a new design and construction was developed for the garments, on the basis of an imagined future scenario that does not entirely comply with today's specifications. Garment factory [a]industri then assisted with a new prototype focusing on long service life and comfort. Employing Kinetic Garment Construction technology, the design changes in the prototypes were informed by the questionnaire and the laundry firm's experiences. The result is a pair of trousers with a better fit and comfort. Vulnerable seams were also moved, changing the overall look of the garment. In addition, [a]industri has designed an overall to go with the trousers, using 3D rendering to see the garments in motion, aiming to create a unified appearance.



PHOTO: (A) INDUSTRI
PROJECT: CIRCULAR DESIGN REGION VÄSTRA GÖTALAND



Proposals for design changes for increased quality.

Potential value/benefits

Environment - Extending the service life of clothes is an immediate gain for the environment. Major quality gains can be achieved by gradually improving processes and procedures, contributing to a lower environmental impact and improved economic sustainability. Reviewing material use also has the potential to reduce the environmental impact. Material sustainability analyses found that combining the use of recycled polyester and application of a mono-material strategy generated the greatest relative environmental benefits.

Customer/society - Increasing product quality creates a win-win scenario. Improvements made in terms of comfort, fit, functionality, and durability, makes it more likely they will be used for longer periods. This consequently leads to lower product lifecycle costs and saves taxpayer money.

DESIGN
SUITED FOR
A CIRCULAR
ECONOMY



*Goal 9:**Make it possible for the garment to function in different contexts and for different kinds of needs.***Opportunities**

- **Design:** Design the garment to make it as versatile and usable as possible without losing its original purpose or appeal.
- **Communication:** Provide inspiration and information on how the garment can be used optimally.
- **Business model:** Review the range and explore the possibility of reducing the number of equivalent items, while at the same time switching revenue streams from volume sales to service development, such as rental, upgrades, after-sales purchases, insurance, etc.

*Goal 10:**Enable a resource-efficient use phase.***Opportunities**

- **Materials:** Make the garment easier for the customer to care for and maintain.
- **Communication:** Inspire customers to get the most out of the clothes they already own through inspiration, styling tips and community.
- **Business model:** Provide services and/or infrastructure that enables circulation of garments between users.
- **Business model:** Provide services and/or infrastructure for customisation of the product, in order to create a better product for the customer – e.g. adaptive sizing or a choice of different design elements.
- **Communication:** Provide inspiration and information on how to look after the garment in a more sustainable way.

CIRCULAR HUB

Circular Hub is a platform at Science Park Borås that supports companies in their development of circular business models. With activities that include sharing of knowledge, coaching, process management, and the delivery of practical tools helping companies to switch from linear to circular business models.

F/ACT MOVEMENT

The F/ACT Movement is a platform and digital community aiming to encourage sustainable behavior and circular consumption through inspiration, interaction and knowledge sharing. F/ACT Movement organizes style challenges and arranges discussions, webinars, and deep dives with its members. Read more on page 32.



Another Studio x Gina Tricot is a remake collection produced in collaboration between Gina Tricot and designers Anna Lidström and Jennifer Larsson. Beyond Retro was producer and material supplier for the collection. What was unique about the project was the serial production approach for remaking garments, and the scale of using second-hand garments as raw material for new garments. The garments were sold in 50 Gina Tricot stores.

Circular design KappAhl

The vision to create a circular and sustainable loungewear collection led fashion company KappAhl to a workshop at Science Park Borås. The aim of the project was to explore various principles for circular design and to create timeless garments in sustainable materials that are durable and recyclable.

The workshop explored different approaches to circular design, which could later be integrated into KappAhl's existing processes for product development, sample handling and production planning. Existing processes were improved with circular principles established during the workshop.

KappAhl chose to design a hoodie and a pair of pants that would fit in their existing range and used circular design principles to promote a long use-phase and enable recyclability at end of the products' useful life.

"Sustainability begins in the design studio – the choices we make here affect every step of the production process and the product's value chain. This is why we're developing products with environmental impact as the starting point, with less sustainable materials being replaced by greener alternatives. While designing so as to encourage circularity," says Lina Nyqvist, Sustainability Manager at KappAhl.

The project has resulted in a collection of seven garments designed for long-term use and optimised material recovery. The material used is organic cotton, with details in cellulose (regenerated fibre that is recycled in the same way as cotton). The company has consciously chosen a wide silhouette to make it more comfortable and versatile in terms of body shape.

The pattern is specifically designed to reduce material use and production wastage and the conventional dyeing process has been replaced with a more resource-efficient technique in terms of water and energy use, known as cold pad batch dyeing.

Product value has been maximised by extending the use phase with a design enabling the arm and leg length to be adjusted. A QR code explaining all about the collection and the project has been printed on the neck label and paper tag.

STRENGTHS	Well thought-through design	WEAKNESSES	Requires bigger system change in order to apply to a majority of the fashion production
	Durable and recyclable materials		
	Longevity through timeless design		
OPPORTUNITIES	Explore new esthetics	THREATS	Difficult to source mono materials/recyclable materials and components to reasonable prices
	Add value-adding circular activities during the life cycle		
	Communicate value-added dimensions to customer		
	Prepare for coming legislation		Risk of creating circular products that end up in linear systems, with missed economic and environmental opportunities

SOURCE: CONDITIONAL DESIGN: FINAL REPORT, SCIENCE PARK BORÅS, 2022

PHOTO: KAPPAHL
PROJECT: CIRCULAR DESIGN KAPPAHL



Potential value/benefits

Environment - Replacing all the materials in the collection with more sustainable alternatives has lowered the overall environmental impact. The materials that have no circular alternative have been phased out, for example, the elastic waistband has been replaced by a drawstring. The chosen lyocell thread is made of cellulose which makes the garment monomaterial and enable multiple options for recycling.

Customer/society - KappAhl's own concept informs customers about how best to look after their garments, offers repair tips and organises the take-back of worn-out products.

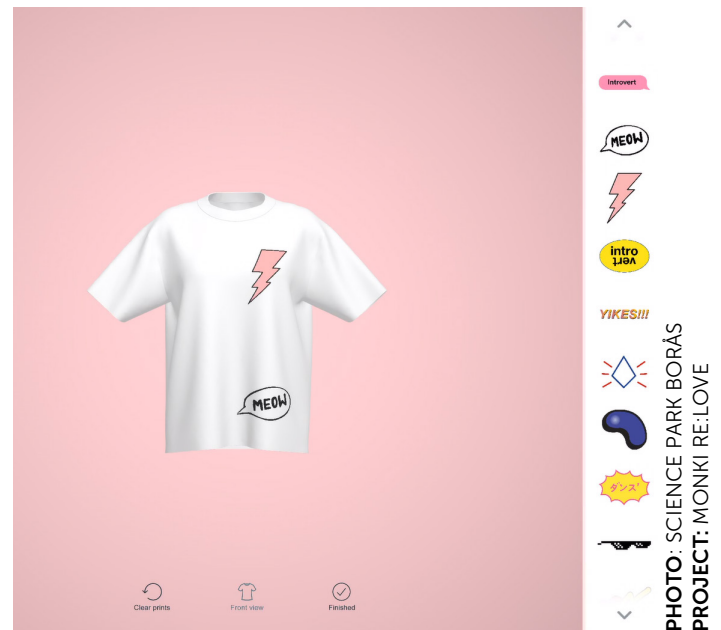
Servitisation

Servitisation relates to using services as a means to facilitate and/or implement circularity. In recent times, the servitisation phenomenon has attracted a lot of attention in the textile industry, with its potential to improve resource efficiency and customer relationships.

A range of activities under the umbrella of servitisation add value by shifting the focus from selling products to selling services related to the products. For the sake of scalability and efficiency, it is worth establishing a product-service system (PSS), which is considered a resource-efficient way of making the value chain more circular. A product-service system covers the essential processes and steps for integrating the servitisation activity into the value chain and the business model, as well as clarifying the critical success factors for each unique project.

The strategy of artification is used by luxury brands, which entails using exclusivity, craftsmanship, and artistry as a means to increase value. The artification strategy could similarly be used for an updating activity, where the artistic/artisan level is raised in order to add value.

Although variations exist, servitisation promotes longevity in garments with infrastructures that facilitate repairs and upgrades, as well as sharing or renting.



SOURCE: RE:TEXTILE: FEASIBILITY OF SERVISITISATION,,
SCIENCE PARK BORÅS, 2022

PHOTO: SCIENCE PARK BORÅS
PROJECT: MONKI RE:LOVE

One user

– repair, update, remake

Potential value/benefits

Environment - The environmental benefit is immediate. A service enabling the user to upgrade his/her garment prevents the necessity to purchase a new one. When implemented on a larger scale, the ability to modify the garment, and as a result, prolong its life, may also lead to lower stock levels among companies, as the same basic garment can be used for multiple designs. Moreover, personalized garments have a higher sentimental value, making it more likely users will use them longer and take good care of them.

Customer - Obtaining a personal look through their own creativity can also be seen as adding value, as it is a way for the customer to strengthen their identity. Customers generally desire a degree of customizability but are put off when the process become too convoluted. Using a module-based design experience appears to be the most ideal middle-ground, offering a level of freedom and creativity without a need for a complex interface or being too overwhelming in terms of choices.

Society - The ecological footprint per garment rises, but the total number of garments falls, leading to a lower environmental impact overall. Similarly, the servitisation activities generate more local jobs per garment, adding value to, and improving the status of, local craftsmanship as well as the service-sector.

Necessary success factors

- A well-prepared facilities and staff trained to use the technology necessary to keep the activities going
- User-friendliness, it has to be easy and time-efficient for the customer.
- The activity must reinforce, not compete with, the brand's look or offering.
- The design and the activity must follow the brand's identity to ensure customer recognition.
- Pre-set activities that meet the brand's desired quality standard, so the end product is approved by the brand.
- Carry out a feasibility study and pilot before a soft launch in-store, to minimise bottlenecks in the process, and to ensure that the activity proceeds successfully.

Multiple users

– rental, subscription

Renting-based business models are potentially less resource-heavy, compared with traditional, sales-based business models. The rental models give customers access to the products for a specific purpose, single occasion or brief period, without driving up demand for new products. Properly implemented, this can mean fewer products need to be produced, since they are used by more than one customer. Studies have shown that renting can be lucrative; it offers a new revenue stream and leads to stronger customer loyalty.

Potential value/benefits

Environment - A well-implemented rental model is less resource-heavy, as fewer garments are produced compared with a sales-based model. Since fewer garments are produced, there are also fewer garments to be disposed of in sales or to become deadstock, i.e. not sold at all. Fewer garments also mean less distribution, which often involves long distances. A rental model creates incentives that, in the long term, can drive up the quality and service life of the garments, since they have to survive more frequent wearing by more users.

Customer/society - Renting is financially beneficial for the customer if the intention is to use the garment for a short period of time. In addition, the garment does not occupy wardrobe space when not being worn – it simply gets returned to the store. A rental model also offers the customer a chance to try an expensive and high-quality garment before deciding to buy it. Renting rather than buying gives the customer the chance to follow trends without a high environmental impact, satisfying the desire for something new without the same ecological burden. A rental system promotes the creation of new local jobs in areas such as laundry, clothing maintenance and repair services.

Necessary success factors

- The option of renting instead of buying needs to be widely promoted so customers know about the service and feel confident about it.
- Customers must be given time to accept a new system and appreciate its benefits.
- Enough sizes/styles must be available so the customer can find something that fits
- Use the leverage of physical stores so that staff can advise and create a more structured experience of the rental service.
- The concept should be kept as simple as possible for the customer – do not make it more difficult to rent than to buy.
- If implemented as a supplementary service, the rental concept should be a clear complement to (not competitor with) the core business.

Perspective 3: Extended life and reuse

Goal 11:

Provide services to extend the lifetime of the product – e.g. adjusting, altering, repairing, restoring or updating.

Opportunities

- **Design:** Facilitate future upgrading or modification of the product through design, material choices, construction and choice of components.
- **Business model:** Provide services and infrastructure for repairing, refurbishing or redesigning garments.
- **Business model:** Provide a service that restores the garment's aesthetic condition and properties, for example through re-dyeing, waterproofing etc.
- **Communication:** Provide information and inspiration via online and physical channels to motivate consumers to repair or update their garments themselves

Goal 12:

Provide replacement parts.

Opportunities

- **Design:** Enable efficient disassembly so that critical elements can be replaced when worn out.
- **Business model:** Offer relevant replacement parts, either as an integrated part of the product's warranty plan or as an additional revenue stream
- **Communication:** Offer inspiration and information for customers showing where replacement parts can be found

UPCYCLING

Main Nué is a Swedish design and repair studio with a focus on repairs, modifications and upcycling of clothing and textiles. Material normally considered unusable forms the core of what the company does, breathing new life into garments through skilled craftsmanship and a unique design aesthetic.

REPLACEMENT PARTS

As a service to its customers, Swiss brand Freitag provides free replacement parts for its products, including buttons, clasps and straps.

ZlideOn sells replacements for zip repairs through its own online store and in partnership with retailers such as H&M and Stadium.

*Goal 13:**Work proactively to promote reuse of the products.***Opportunities**

- **Design:** Ensure quality in all aspects of the product (material, function, aesthetic), so that it can be reused in circular systems and be valuable in the second-hand market.
- **Business model:** Create an infrastructure that facilitates second-hand sales.
- **Business model:** Explore the possibility of renting out products by asking the following questions:
 - How would a rental service create value for the customer?
 - Is the product suitable for rental?
 - Does rental have the potential to reduce production volumes and improve resource efficiency?
- **Communication:** Provide information, inspiration or other material to help the customer reuse, repair or update the product themselves via the website/social media/store.

HOUDINI RENTAL

Outdoor and leisure company Houdini Sportswear has worked with re:textile on a project to attempt upscaling the company's current rental system. Workshops were arranged for Houdini's customers to find out how a rental system could be designed to add as much value as possible for the customer. The project resulted in a report on the feasibility of a business model based on rental, looking at factors such as logistics, range plan and pricing. Read more in the article on page 40.

F/ACT Movement

F/ACT Movement is an initiative by the Gothenburg Region and Science Park Borås that aims to promote more sustainable production and consumption of fashion and textiles. F/ACT Movement inspires consumers to make more sustainable fashion choices and to use what they already have in their wardrobe. This is achieved via social media, where local ambassadors (known as f/activists) share inspiration on how they manage a sustainable wardrobe. In addition, the project supports companies and entrepreneurs seeking to develop sustainable and circular products and services based on the needs of the young, conscious consumer, and always maintaining a focus on environmental benefit.

The term f/activist

A f/activist is a person who loves fashion and strives towards a more sustainable consumption. F/activists seek a long-term relationship with their clothes, and strive for a sustainable and circular wardrobe that doesn't drain the planet's resources. F/activists are ambassadors for sustainable fashion who enjoy sharing second-hand finds, remake projects, as well as various tips via social media.

Anybody can become a f/activist simply by trying more sustainable fashion alternatives and learning more about the environmental impact of consumption. The important thing is to find your personal way of being a circular consumer. Together, f/activists are driving the fashion world towards a sustainable future.

The following pages present the results from a questionnaire sent to f/activists, plus the results of three online panel debates organized jointly with the fashion network within Region Västra Götaland's Climate 2030 initiative. The debates were held on 25, 26 and 27 May 2021. A total of nine f/activists took part over the three days.

PHOTO: GUDRUN BONÉR
PROJECT: FACT MOVEMENT



Insights on circular services

Keen to look after what we have

The data from the project indicates high consumer interest in services relating to the maintenance of their own wardrobe. The participants were eager to repair and/or remake the garments they already owned rather than replacing them. However, not everyone was willing to go equal lengths in terms of repairs and services. Companies should explore the varying drivers and needs to best meet the demands of every type of these consumers.

Quotations from f/activists

"It feels worth investing in clothes you really like."

"It's important that the stores have in-house services, so you don't have to go around lots of different places."

Threshold for renting & exchange

According to the data, the f/activists hesitate using services relating to rental and clothing exchange. They find dealing with parcels inconvenient and tend to have an emotional connection to their wardrobe, which makes it difficult for them to abandon their clothes. Innovations that simplify the process, such as IT systems and infrastructure, could lower the thresholds and promote sharing. A culture shift is also necessary to scale up the sharing economy. On the other hand, the panel debates showed an openness to renting garments for special occasions, such as dinners or big parties, indicating an opportunity to develop services for particular product segments and target groups.

How your company can step up its circular services

Offer services in-house

While people may want to look after what they own, many are uncertain about how to do it. This is an issue that existing clothing stores and second-hand markets can alleviate by offering repairs and remake services in-house. Doing so not only promotes sustainable fashion, but also gives your business a unique selling point (USP) in the market. Another way of offering circular services might be to have a wardrobe consultant/personal shopper with a sustainability focus. Digital guides or physical workshops on clothing maintenance are also a means to grow customer confidence and lower the threshold for consumers to use these services.

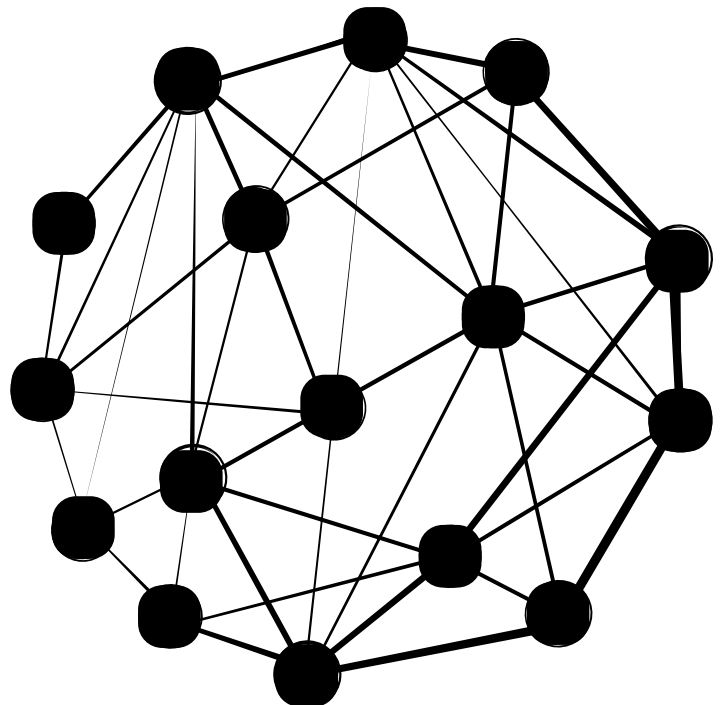
Create circular partnerships

F/activist seek to support local business but are often hindered by inaccessibility and inconvenience. It remains more worthwhile to buy new than to maintain what you have. So how can we remove this obstacle? Part of the solution may be to create circular partnerships between local companies, making it easy for consumers to find everything under one roof. Use each other's resources and support each other's businesses. If you run a shoe shop, you could benefit hugely from making contact with a local cobbler to whom you can refer your customers, thus creating added value. Or why not send faulty clothing to a fashion designer who can create exciting new garments for your store? There are many different ways to create a circular network.

Promote innovation

Key pieces of the puzzle when it comes to sustainable fashion consumption is accessibility and convenience to lower the thresholds. As long as fast fashion remains the quickest and most convenient option, it will attract the masses, regardless the available information about its environmental impact. Become aware of how your company can contribute to more resource efficient clothing consumption: Ask yourself the question: "What might a more sustainable and circular system for our clothing look like?" Identify any obstacles and discuss how you can overcome them.

Also take a step back from your own business and look around you. Are there any opportunities to collaborate with other parties, to accelerate the pace of development and come up with key techniques that you could benefit from? If you possess a strong existing brand, use it to promote new solutions that require a large number of users, such as sharing services.



Insights on second-hand

Easy to become overwhelmed

The f/activists generally feel very positively toward both charity-based and more curated second-hand. Before the project began, most of the participants were already active in the second-hand market, but they developed a new appreciation for second-hand, from both an environmental and an economic perspective.

Nevertheless, many participants feel second-hand stores often fall short when it comes to range and inspiration. Styling and the store interior are rarely a priority in the second-hand market, which deters many potential customers.

Limited range in small towns

The data shows a high level of interest in physical and digital second-hand shopping among f/activists, although it is clear from the panel debates that demand outstrips supply, particularly in smaller locations across Sweden. There is a major opportunity for businesses to expand their reach in small towns or to create a digital presence that makes second-hand available to residents of less densely populated areas.

Quotations from f/activists

"I hope we'll see more well-stocked second-hand stores in small towns."

"They were selling clothes by the kilo straight from pallets, with everyone grabbing at them. Hardly dignified or good for the clothes, and also not particularly inspiring or attractive."

How your company can become an attractive second-hand destination

Improve availability

One of the most common complaints about the current second-hand market relates to availability. The f/activists who lived in small towns reported a lack of well-stocked and interesting second-hand stores in their local area. This hints at a relatively untapped market for companies and organisations in the secondhand sector. Have the courage to expand into online retail and rural areas.

Store location is undoubtedly a key factor. In recent years, it has become increasingly common to find second-hand stores in shopping centres, or integrated with regular clothing stores. It increases the accessibility, while also lowering the barrier, for those remaining unconvinced by second-hand.

Create a unique profile

Second-hand stores used to be a place where you found everything from juice machines to designer jeans, but we are now seeing a shift towards a more segmented market. Like traditional clothing retailers, second-hand stores can also target specific customer groups. Stand out from the crowd by focusing on a particular type of style or age group. Strong and attractive brand owners are recommended to build a resell business around their own products

Filters and functions

To prevent consumers from being overwhelmed when they enter the store or website and leaving as quickly as they arrived, it is important to offer a good general overview. Stores and online retailers selling new products are experts in providing an engaging retail experience, which is something second-hand stores can take inspiration from. In physical second-hand stores, garments are most commonly sorted by type, which is not the case with conventional stores. Focus instead on themes, style combinations and occasions. This not only provides a good overview, but also helps to inspire the customer.

When it comes to online second-hand stores, it is important to have a user-friendly interface and sorting functions that allow visitors to filter by size, colour, style, occasion and brand. Good terms for returns and order cancellation are other factors that should not be overlooked.

Trained staff

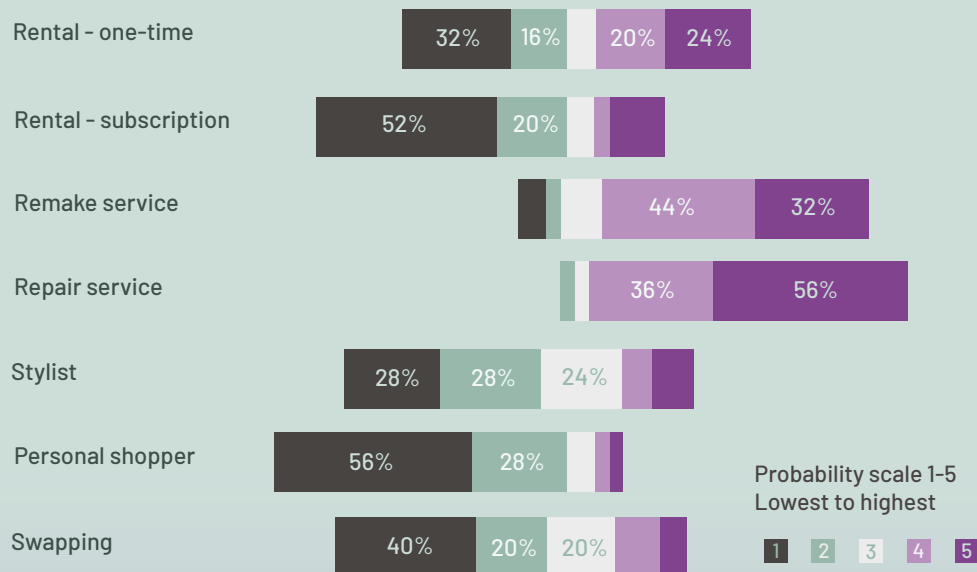
The majority of shop assistants in retail are trained in customer service and styling, and are able to share their unique knowledge of the range with the customer. While staff at second-hand stores need the same kind of expertise, the panel debates with the f/activists expressed a desire for the staff to also be knowledgeable about environmental issues and textiles. It is thus essential that the staff are given the right knowledge in order to further raise the status of the second-hand market.

Science Park Borås and the Nordic Textile Academy have launched re:skills Textile & Fashion (www.reskills.nu), a free, online skills development programme aimed at both companies and individual employees. One of the aims behind re:skills is to improve competencies in the areas of sustainability, circularity and digitalisation.



Attitudes to circular services 2021

How likely are you to use below services?

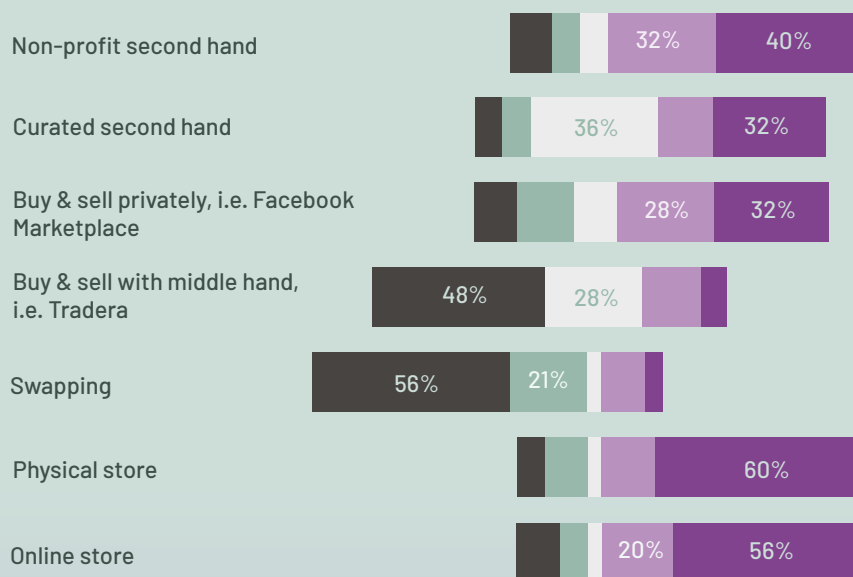


Attitudes to second hand 2021

Willingness scale 1-5
Lowest to highest

1 2 3 4 5

Where to you prefer to shop second hand?



Monki Re:Love

This case involves a store concept for clothing updates, which was introduced in order to create a production system for commercial redesign. The project also explored the potential to extend the life of garments by developing services that could decrease the need for new garments and create business opportunities.

Monki's customers were invited to bring their own garments into the store to have art printed on them. To facilitate this process, customers were to use a specially developed app enabling them to visualize the print, and the placement of it, before actually printing it on the physical garment. During the project, many customers showed interest in the printer as a means to cover stains and blemishes of their favorite garments. It was a conscious decision to place the printer in-store. It is a place where customers come in with garments nearing the end of their lifecycles, making it more likely that the printer will be used. The possibility to modify a garment also incentivizes customers to use their garments rather than throw them away. Thus, by placing the printer physically in-store, a loop is created. In addition, engaging the customer in the design process bolsters the customer-brand relationship. To retain brand and aesthetic consistency, the design options were limited to a number of pre-selected prints. A smooth experience is key, which can be achieved by having qualified staff guide customers through the design process. All in all, the initiative proved popular among customers.

Potential value/benefits

Environment - Extending a garment's lifetime, which in this case, is achieved through repair or modifications, benefits the environment. Such activities also bolster the emotional bond between garment and wearer, making it more likely he/she will take good care of it.

Customer/society - Adding new activities to the product's value chain can potentially generate new jobs. Customers gain added value from a unique and personalised product, and from being able to get involved and interact with both

the app and printer in an easily accessible way. In addition to being an environmental gain, customers save money on breathing new life into an old garment instead of buying a new one.

STRENGTHS	Innovative and fun activity	WEAKNESSES	Sensitive and expensive technique
	Simple interface for customer		Needs frequent service
	Applicable in the value chain		Time consuming process
	Attracts customer engagement		
OPPORTUNITIES	Customer interaction in the process	THREATS	The machine requires space, impacts sales per sqm
	Expend artworks		Possible challenge to maintain interest due to changing trends etc.
	Involve local artists		
	Create unique event		
	Streamline and optimize process to maximize value		

SOURCE: RE:TEXTILE: FEASIBILITY OF SERVICITIZATION, SCIENCE PARK BORÂS, 2019



PHOTO: MIRJA SCOTT
PROJECT: MONKI RE:LOVE



Marketing opportunities

- A digitalised technology with physical attributes that can easily be promoted both online and physically in-store.
- The activity involves the customer and increases brand loyalty.
- An activity that contributes to a circular flow of products or garments.
- Lowers consumption rates.
- Individualised consumption.
- Customer-centric.
- Focus shifts from selling a product to selling a service.

Innovation opportunities

- Use the printer and the app earlier in the process, maybe before the garment is produced.
- Limited edition artwork.
- Use the app for visualisation purposes when selling a redesign service.
- Create circularity in a linear business model.

Houdini Subscription

Houdini Sportswear launched a pilot project for a subscription service for clothing. The aim was to make it profitable and attractive while reducing the environmental impact by 40%. The pilot project ran for six months with 85 test pilots in Stockholm.

The test pilots were offered three different clothing packages with a varying number of garments from the available wardrobe. They were able to then rotate these freely for a fixed monthly fee or alternatively pay per garment for a fixed charge. The project was conducted at Houdini's HQ in Stockholm allowing the company to regulate and process all information given and received. During the project, the company also tested a beta version of the website able to provide doorstep deliveries and returns by bike. The subscription service achieved medium to high customer satisfaction in the pilot project assessment.

Potential value/benefits

Environment - A subscription service facilitates circulation, and decreases disposal of garments, which lowers the need for newly produced clothes. The circulation of garments creates a flow that is beneficial for the environment, as it helps to reduce new production. In Houdini's case, the implementation of a subscription service led to a 35% reduction in climate footprint.

Necessary success factors for securing environmental benefits

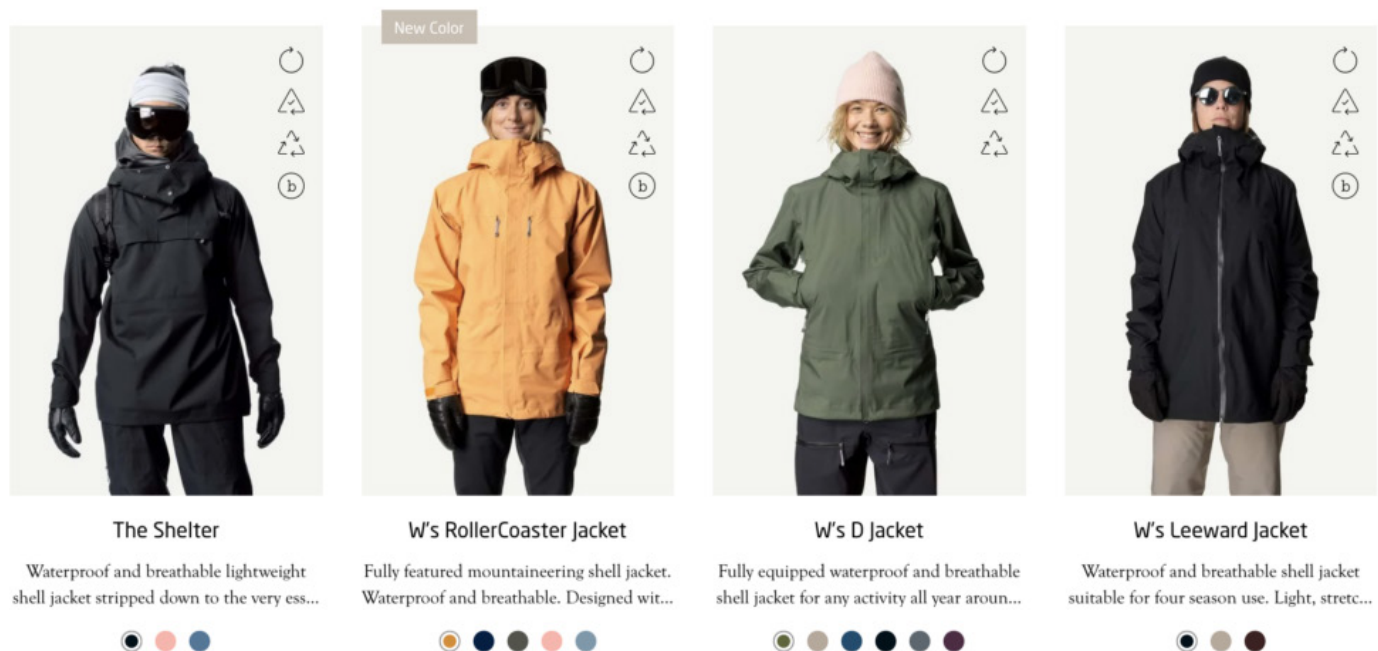
- Maximise the durability of the garments in the system.
- Encourage users to choose sustainable delivery services and/or to travel by public transport, bicycle, etc. to exchange garments.
- Set up garment exchange hubs that are easily accessible by public transports
- Use fossil-free delivery methods.
- Encourage subscribers not to launder the clothes before returning them, and not to launder them more than necessary in general

- Use eco-labelled laundry firms for laundering of the products before a new rental period.
- Encourage subscribers to wash at low temperatures and not to tumble dry.

By following this advice, the subscription can result in a 56% lower environmental impact than purchasing the same Houdini garments.

STRENGTHS	Can lower climate impact Better relationship with customer Creates community Try garment before buying Even and predictable revenue stream	WEAKNESSES	Manual handling New routines takes time to implement Short cycles mean more washes and more wear and tear
	OPPORTUNITIES		THREATS
	An insurance can remove feelings of uncertainty New products and variants can be tested in a small scale Can widen the customer base		New type of consumption can take time for customer to accept Some garments become more attractive Logistic intensive Service level requires certain stock levels. Risk for obsolescence and loss of environmental benefits

SOURCE: FINAL REPORT, INNOVATIVE CIRCULAR BUSINESS MODEL FOR HOUDINI SPORTSWEAR, RE:SOURCE, 2019



Customer - The service saves money and wardrobe space. Being able to exchange garments means you don't need to own as many. The customer gets the opportunity to try an item before deciding to purchase it. Several types of subscription are offered for different customer preferences, so as many customers as possible can find the right kind of service.

Society - Moving from transactions to relationships with customers may positively influence their ingrained patterns of consumption. The results of the pilot project showed that customers saw several significant positive changes in their consumption behaviour. The service also proved to be lucrative for the company. The infrastructure necessary to maintain such a service creates jobs in professions such as laundry, repair, and logistics.

Marketing opportunities

- Rent out products as a package deal for a particular type of activity, e.g. in partnership with holiday or activity organisers. This allows the user to focus on the experience rather than which product they need to buy.

Innovation opportunities

- Offer curating or styling to inspire customers with looks for specific activities.
- Offer advice on the proper use of the garments in specific activities.

Necessary success factors

- An upscaled version of the system with 1000 users will become profitable over a four-year period, with rising profitability as the number of users increases.
- Scale up quickly with at least 500 subscribers for economic sustainability.
- Maximise the durability of the products in the system, so they maintain high quality for a long time.
- Maximise the perceived value for the customer by, for example, identifying which products are most likely to be purchased, on the basis of cost or current trends, and offering these in the subscription system.
- Get to know the users so you can tailor your products and services to their needs.

Houdini Rental

Outdoor and leisure company Houdini Sportswear has worked with re:textile on a project to attempt upscaling the company's current rental system. Workshops were arranged for Houdini's customers to find out how a rental system could be designed to add as much value as possible for the customer.

The project resulted in a report on the feasibility of a business model based on rental, looking at factors such as logistics, range plan and pricing. At the time of writing, Houdini still has a successful platform for its rental service.

Most of Houdini's customer who choose to rent clothes do so for their winter holidays, and for that they usually need to hire a whole outfit. The reasons for choosing to rent vary greatly from customer to customer. Short business trips, a first winter holiday and families leaving equipment at home are among the most common prompts for renting. Other customers who like to rent their outerwear from Houdini include people trying out a new sport and those who are simply interested in the concept and the brand.

A significantly higher number of garments are rented out in the autumn or winter, when they are most expensive to buy. Over the three years that Houdini trialed the rental concept, as many as 91% of the bookings occur in the winter. Outerwear for cold weathers is more expensive and is used less often, which is they are more likely to be rented. This causes the revenue stream to be irregular over the course of the year. Repeat customers value the service, the quality of the garments and the sustainability aspect. The rental service widened the reach of the brand to more customer groups.

Potential value/benefits

Environment - A garment rented instead of bought is a potential environmental gain. Renting also alleviates the risk of buying the wrong size. A renting system demands higher quality standards because garments will have to endure more use.

Customer - Financial benefits from not needing to own the garments. Renting first gives customers a chance to test and assess an item before deciding to buy it. Events such as "Houdini Hangouts" enable customers to try products in their intended environments.

Society - Houdini is clear about its environmental profile and practises what it preaches. The benefits of such services stretch beyond mere corporate profit. It improves the consumer experience and lowers the burden on our environment?

STRENGTHS	Help customers make environmentally conscious choices Way to gain knowledge of customer preferences Houdini Hangouts creates a community Creates income on the same garment several times Try garment before buying	WEAKNESSES	Manual handling New routines takes time to implement Short rental cycles mean more washes which contribute to more wear and tear Uneven distribution on rental garments over the year
	An insurance can remove feelings of uncertainty New products and variants can be tested in a small scale New distribution forms for rental can widen the customer base If implemented successfully overall profitability can increase		Many customers buy their rental garments which leads to less supply New type of consumption can take time for customers to adjust to Logistic intensive Service level requires certain stock levels. Risk for obsolescence and loss of environmental benefits
OPPORTUNITIES		THREATS	

SOURCE: RE:TEXTILE: FEASIBILITY OF SERVICITIZATION, SCIENCE PARK BORÅS 2019

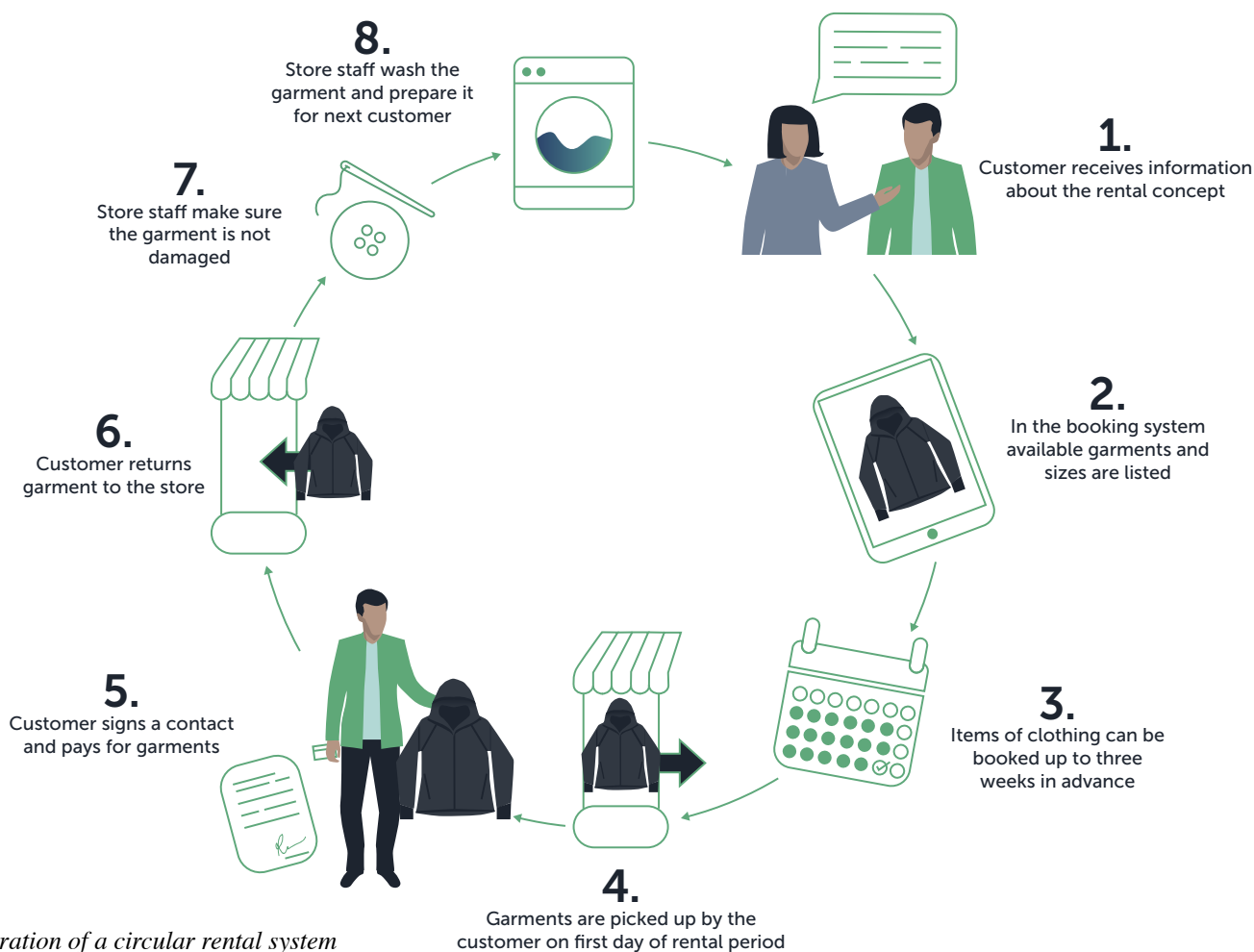


Illustration of a circular rental system

Marketing opportunities

- Organize in-store activities that raise awareness about the benefits of renting.
- Labels with statements such as “you can also rent me”, motivate and provide information to customer without sacrificing retail space.
- Joint marketing with, for example, hotels where the rental concept is offered.
- Make bundled rental offerings, for example including clothing when renting outdoor equipment.

Innovation opportunities

- Create a platform enabling customers to buy used or sell their own Houdini garments.
- Continue developing the Houdini Story concept. Having people share their photos and experiences strengthens the community around the brand? This can be taken a step further with a dedicated Houdini app.
- One could design the app such that it shows the ecological footprint of the garment rented. The app could also compare the footprint of a new purchase with a specific rental garment.
- A point based (reward) system for customers based on the number of days/occasions that they rent garments.
- Different categories of garments could be offered – from basic to higher-end and more advanced products.
- RFID tags or other information carriers could be used to monitor the garments’ lifecycle, logging how often they are rented, laundered and so on.
- In cities, bike couriers could be hired for deliveries and logistics for a lower ecological footprint.
- Badges or value-adding tags to raise the status of garments owned for a long time.

Perspective 4: Remanufacture and recycling

Goal 14:

Design the product to enable disassembly for efficient remanufacture or material recovery.

Opportunities

- **Design:** Enable more efficient disassembly of e.g. zips, buttons or components of the garment – for example through a modular design with easily replaceable components or by constructing it using fewer pieces (principle of zero waste).
- **Design:** Avoid design and manufacturing shortcuts which may complicate eventual disassembly, for example, avoid using adhesives and interfacing.
- **Innovation:** Participate in innovation projects to develop solutions for efficient disassembly.

Goal 15:

Facilitate recovery of valuable materials at the definitive end of a product's service life.

Opportunities

- **Materials:** Switch to a recyclable material without compromising the product's functionality or properties.
- **Materials:** Ensure traceability and transparency along the whole value chain in order to enable recycling.
- **Design:** Harness innovative design methods to avoid non-recyclable materials and achieve more desirable properties.
- **Design:** Use modular design that enables separation of material types that require different recycling processes.

DISSOLVABLE STITCHES

Belgian company Resortecs is working to develop a technology and process for easier disassembly of textile products by means of dissolvable stitches.

KINETIC GARMENT CONSTRUCTION

Alternative construction methods can be used to augment functions already present in the material without any unnecessary additions. The traditional method of pattern construction uses an estimate of the body, based on horizontal and vertical measurements of a static body in an upright position. Kinetic Garment Construction proposes a movement-based method of garment construction that differs from the traditional theory and its related methods by focusing on the interaction between the material's different directions and the body's bio-mechanical structure. This way the body's natural movements are "designed into" the garment and stretch material can be avoided.

Goal 16:

Ensure that the product's dyes and functional chemicals do not hinder material recovery.

Opportunities

- **Materials:** Switch to recyclable material with better properties in terms of the intended function, thereby removing the need for problematic chemicals.
- **Materials:** Switch to alternative dyes and function-related chemicals that are compatible with the intended recycling process.
- **Materials:** Ensure traceability and transparency along the whole value chain in order to enable recycling.
- **Design:** Use a modular design that facilitates separation of the parts that are more complex to recycle.

Goal 17:

Work proactively to promote remanufacture and recycling of products that cannot be reused.

Opportunities

- **Design:** Explore remanufacture as a way revitalize products.
- **Business model:** Work with textile recyclers to recover the material from scrapped products that cannot be used in any other way.
- **Innovation:** Participate in innovation projects that promote textile recycling.

RE:TEXTILE

re:textile is a project at Science Park Borås aimed at helping the textile and fashion industry to become more resource-efficient and circular. The focus is on designing products that are adapted to circular flows, providing services to extend the life of the garments and help customers to maximize the potential of their wardrobe, and on promoting manufacturing and remaking to bring scrap material into new user cycles. The project has resulted in a number of pilot initiatives with companies and multiple feasibility studies.

Circular workwear

Production of workwear for the healthcare sector follows strict rules ensuring the health and safety standards of the garments are met. Little attention has been paid to the actual design of the garments. A group of actors in the sector for medical workwear wanted to investigate the potential benefits that changing current designs might offer, redesigning the garments according to the principles of conditional design and then evaluating them from both an economic and an environmental perspective.

The role of the various companies in the group was to contribute knowledge from their specific role and position in the value chain. The companies taking part were FOV Fabrics, Martinson and Elis (formerly Berendsen). Science Park Borås and circular.fashion supported the process and were responsible for the evaluations.

The process began with a workshop where two garments were selected. Based on their prevalence/predominance and potential to function in circular systems. First garment was a scrub top worn by staff in surgery and the other was a pair of trousers that are used in various scenarios by different kinds of medical staff. Since the clothing is used in the medical profession it needs to adhere to SIS standards.

Most of the requirements in the standards relate to materials and production, as well as documentation for the garments.

The scrub top meets standard SS8760164:2020 and is used in surgery rooms so it needs to meet high levels of quality and hygiene and be comfortable to work in. Its main distinguishing feature is its ability to minimize the spread of airborne bacteria emitting from the skin, which is why the tops are only able to be laundered a maximum of 120 times.

The trousers, which meet standard SS8760120:2020, are used by many different healthcare professionals and, like the tops, carry an RFID chip for traceability.

STRENGTHS	Guiding standards High volumes mean lever for circularity and reduced environmental impact Possibility to reduce usage of water, energy and chemicals The garments is part of a rental system which is an advantage concerning circularity	WEAKNESSES	Limited by standards One solution needs to fit many users
	Update product and washing standards to modern techniques to reduce energy use and lower costs Find cooperations for recycling Include and educate users		Higher production costs Skepticism to synthetic materials
OPPORTUNITIES		THREATS	

SOURCE: CONDITIONAL DESIGN: FINAL REPORT, SCIENCE PARK BORÅS, 2022

The concept developed during the workshop focuses on a circular system, where the participating companies work together to extend the garment's lifecycle and to enable recycling at the end of its useful life. For example, the tops could be used by another department with less stringent requirements after having passed the limit of 120, and be deployed in other products. At the moment, the garments are not reused/recycled at all when they are worn out, so creating opportunities for a closed material loop became the main aim of the prototypes that were developed.

Two materials with different proportions of recycled polyester were tested for the tops, one a 50-50 mix of recycled and virgin polyester, and one made from 100% recycled polyester. These were compared and evaluated in relation to the current material. The materials tested for the trousers – the originals of which were 65% cotton and 35% polyester – were a blend that replaced the cotton with Tencel (as the users wanted the trousers to not be entirely synthetic) and a version in 100% polyester to facilitate efficient recycling.

In addition to evaluating materials, the project also examined opportunities to extend the service life of and reuse the garments within healthcare. The evaluation compared the environmental and financial differences between the current linear model and circular scenarios in which different combinations of material choice, service life and recycling were tested. The results were calculated using the Higg Materials Sustainability Index (Higg MSI) V3.2 and the Higg Product Module (Higg PM)⁴ V1.0, developed by the Sustainable Apparel Coalition (SAC). The recyclability of the materials was verified using criteria gathered from recycling companies, together with circular.fashion⁵. The Material Circularity Indicator (MCI), developed by the Ellen McArthur Foundation, was then used to assess and verify the potential for circularity⁶.

The best MCI results were achieved for the scrub tops made of recycled polyester, which was then recycled at the end of the garment's life. Further extending use by 33 washes would further improve the results, but it is considered difficult in practice, as the garments are currently considered worn out after 120 washes. This is an area that requires further investigation. In terms of the production process, the alternative in 100% recycled polyester, coupled with a change in dyeing method to spin dyeing, generated the best environmental benefits in terms of carbon emissions and water use according to the Higg MSI, with a 19% reduction compared to the original design. Both the original material and the recycled material were considered to be recyclable.

The tests for the trousers produced similar results. Both alternatives cut carbon emissions and water use compared with the original design and were judged to be recyclable. However the alternative with 100% polyester achieved the best MCI results, as the recycling process for this material is more efficient.

Looking at the whole picture, the combination of recyclable garments, an extended use phase and switching to low-impact materials (that still meet the criteria of longevity and recyclability) achieve the best environmental benefits. With the trousers, the Tencel alternative has an advantage, as many of the users oppose 100% polyester garments. However, the polyester garments have an advantage in terms of maintenance and longevity. Garments made of 100% synthetic material are better equipped to endure intensive use and repeated washes while demanding shorter drying cycles. By prioritizing comfort in design and material choice, while educating users about the benefits of such textiles for specific activities, companies can reduce public opposition against synthetic materials.

Despite strict standards, all efforts must be made to find ways to lower wash temperatures; the impact on energy consumption is significant. These vary from country to country but the German standard for industrial laundering of medical workwear permits lower temperatures, using chemical disinfectants to clean the garments. Studies⁷ have shown that a lower water temperature, combined with reduced water use, can bring major environmental gains on certain fronts, but more knowledge is needed to judge the environmental benefits and risks of using disinfectants in terms of water pollution.

Potential value/benefits

Environment – There is potential to reduce the environmental impact of production by making appropriate material choices. Recyclable workwear creates the conditions to scale up textile recycling, which can help in replacing fossil-based materials with recycled alternatives, at least to some extent.

Customer/society – Circular activities such as repairing, reusing and even recycling generate more local jobs. Discussions on updating current sustainable standards also feed into other industries that use those same standards.



PHOTO: MARTINSON
PROJECT: CIRCULAR WORKWEAR

⁴ The results have been calculated within the Conditional Design project and are not verified. Results include only cradle-to-gate impact, transport is not included in the calculations..www.higg.org

⁵ <https://circular.fashion/>

⁶ <https://ellenmacarthurfoundation.org/material-circularity-indicator>

⁷ Eberle, U., Lange, A., Dewaele, J. & Schowanek, D. (2007). LCA Study and Environmental Benefits for Low Temperature Disinfection Process in Commercial Laundry (12 pp).

Remake and remanufacture

Creating a new garment from an old one – remake/remanufacture – is becoming increasingly common in the fashion industry. But it still only happens on small scales despite the global awareness that the climate crisis is approaching and imminent industry-wide transition is paramount. The practice of reuse to revive and add value to old garments is an effective way to tackle climate challenges and attempt to decouple economic growth from negative environmental impacts. Reuse has shown to create jobs on smaller scales, but for the practice to really shine in terms of environmental benefits and profitability, it needs to be scaled up.

Closed-Loop Supply Chain (CLSC) was developed to make the transition to circular business models and value chains more accessible and efficient. CLSC promotes synergy between production and reuse, taking into account the product's entire lifecycle, including reverse logistics and other processes geared towards keeping the product in a circular loop. In this case, reverse logistics covers garment collection, disassembly, inspection, sorting, cleaning, manufacturing, controlling, product testing, and eventual distribution. Keeping the product within the value chain minimizes the loss of its original value. A pair of trousers can, for example, be made into a skirt instead of being shredded for other purposes.

Reused (because “reuse” is used through the whole text) garments can be described as “garments created from discarded materials coming/stemming from either consumers or textile companies”. For clarity, the remanufacturing process can be divided into three levels, based on the material's condition and the desired design of the end product. The simplest level is “refurbish”, which involves minor changes such as replacing labels, minor adjustments or repairs so the end product feels like new. At the next level – “recouple” – the garment is updated with new embroidery, new printing or a new colour, for example. The top level, which is the most complex and resource-intensive, is called “reconstruct”. This involves deconstructing garments and reconstructing them as an entirely new product.

STRENGTHS	Unique garments	WEAKNESSES	Complicated grading and quality determination on recycled products
	Clear environmental advantage		Often small-scale production
OPPORTUNITIES	Quality and functionality can be as good as the original product	THREATS	Material quality cannot increase from original
	New market segment		Knowledge of the value chain/ the business model is limited
	Cooperation with collectors creates synergy effects		Equate access and demand flows
	Using a creative design process to find opportunities and create profitability		Risk of internal cannibalization

SOURCE: RE:TEXTILE FEASIBILITY OF FASHION REMANUFACTURING, SCIENCE PARK BORÅS, 2018

Potential value/benefits

Environment - One of the cornerstones of remanufacture is its sustainable approach to production/manufacturing. Since the input materials are garments whose production has already had its impact on the environment, their environmental impact could, in the best case, be discounted. However, a more realistic calculation method would be to divide up the environmental impact from the material's production across the value chains to which the garment belongs over its life-cycle. Remanufacture thus contributes to a lower environmental footprint and reduces the use of water, energy and chemicals, compared with producing a new product. However one looks at it, a remanufactured or remade product is likely to have environmental benefits compared with an equivalent product that is newly manufactured.

Customer/society - The customer gets a unique garment of potentially the same high quality/high value as a new one, while minimizing waste. More jobs are created locally within the circular value chain, such as collection, handling, manufacturing and distribution.

Critical success factors for upscaling remanufacture

- **Sourcing of material:** Assure high proportions of quality material that meet the specifications while maintaining continuous supply to create the conditions for profitability. The quality of the material is for obvious reasons highly dependant on the quality of the input material, i.e. the original garments, and is also strongly affected by the technique used for disassembly. The disassembly itself is often time-consuming, labour-intensive and expensive.
- **Standardised and flexible remake processes:** streamlining the manufacturing processes reduces the production costs. Being able to make adjustments at product level, within set parameters, increases the products' market penetration.
- **The knowledge and authorization to make design decisions,** plus collaboration and communication in the production chain: To establish an efficient production set-up for remake, a systemic approach with focus on the end product must also be maintained. For example, during cutting and sewing, decisions may need to be taken that could affect the garment's functionality and aesthetic. This requires a higher diversity in knowledge and skill-sets among employees compared with ordinary textile production. Rapid lines of communication with the designer or a mandate to take design decisions also make the work easier.
- **IT system that supports iteration of products and circular flows:** information management is one of the bottlenecks that drives up the cost of circulating materials and products. Processes involving garment restoration usually require manual entry of information. Dramatic cost reductions could be achieved by automating these processes by using, for example, digital product passports and a compatible product lifecycle management (PLM) system that supports product iteration/extended lifecycles.
- **Value creation for the customer:** Companies that sell remanufactured or remade products need to build their offering and business model so it meets the preferences of the end customer. For example, products with unique design and style, ethics or the emotional values associated with "preloved" garments.

Innovation opportunities - Create new business models around reuse. Collaborate with various companies along the value/supply chain, from production to recycling facilities. Develop new technology for disassembling existing garments ready for remanufacture. Structure the work around the creative design process in order to identify business opportunities.



PHOTO: KIMBELY IHRE

Remake Cheap Monday

The workwear sector, in which garments face heavy use and are produced according to strict requirements, disposes large amounts of clothes each year. Textile service company Berendsen⁸ throws away around 300,000 items of its worn-out workwear each year, because they no longer longer meet the necessary industrial standards.

Instead of letting these garments go to waste, Berendsen worked with re:textile to create a circular business opportunity by extending the life time of their garments. Together with fashion brand Cheap Monday, they produced a collection of redesigned garments. The collection comprised around 1,000 items, from jackets, trousers, T-shirts and sweatshirts to bags.

All the products were made using material recovered from Berendsen's workwear. The worn fabric with its removed labels, small holes and abrasions made each garment unique. The clothing was then sold through Cheap Monday's various distribution channels in 2018. Dyeing, printing and updating the worn-out workwear breathed new life into the garments and attracted a new customer group. The ambition of the project was to spread awareness about how clothing can be recycled and to explore the potential to develop commercially viable redesigned garments in line with the aesthetics of Cheap Monday. The local companies Idésömnad, Korallen, XV Production and Nordiska Etikettbolaget helped with the production.

The brand-new collection, dubbed c/o Cheap Monday 2018, showcase how clothing from discarded workwear can be transformed into fashion, highlighting a previously untapped material resource and demonstrates the potential of redesign. The project resulted in the universal agreement that continuous work on sustainability is only going to become more important. Using post-use material to produce new products is a perfect example of how to confront such challenges.

Carl Malmgren, then creative director at Cheap Monday, considered working towards a more sustainable future to be essential. "With c/o Cheap Monday 2018, we discovered a significant source of garments that were considered to be

of no further use. Giving these garments a new lease of life feels fantastic, as every item already has its own history."

Workwear is often very high quality, as it is developed to tolerate extreme conditions. This means that it has the potential to last longer.

STRENGTHS	<ul style="list-style-type: none"> The consumption of raw materials is reduced Lower environmental impact than new manufacturing Reduced use of chemical Less water consumption Material fraction with high alignment and predictability compared to used consumer textiles 	WEAKNESSES	<ul style="list-style-type: none"> Communication within the project, e.g. which material wear is acceptable/desirable Need for bigger system change in order to make it scalable and profitable
	<ul style="list-style-type: none"> Pilot project provides design freedom Express brand esthetics and company DNA in remake collections Test on a small scale On-trend design increases the value Increase the consumer experience related to re-use 		<ul style="list-style-type: none"> Difficult to ensure sufficient material flow Customer maturity to value remake
OPPORTUNITIES		THREATS	

⁸ Since this project Berendsen was acquired by the French group Elis and now operates under the Elis brand



Potential value/benefits

Environment - Use materials that already exist and have already been used. Remake has a lower overall impact on the environment than new production, as it reduces the consumption of new raw materials, water and chemicals. It also extends the service life of each garment. The companies now have knowledge about circular flows that they can apply to future activities.

Customer/society - It engages customers in an exciting project and gives access to garments that are both unique and sustainable while inspiring them to reevaluate their habitual consumption patterns.



PHOTO: CHEAP MONDAY
PROJECT: C/O CHEAP MONDAY

Remake Lindex

Fashion firm Lindex developed a remake collection by creating new garments of unsold goods from previous collections. With the aim of giving them a second chance on the market by redesigning them according to the latest trends and making them more commercially viable.

Through redesign (remake), the original value of the clothes was either reclaimed or, in some cases, increased. Lindex' goal can be summarized as exploring economically and practically viable ways to deal with unsold stock through remake.

A collection of five garments was designed and produced at the Re-design Factory using garments from previous seasons of the Lindex Better Denim collection. The original garments were either decorated with new details or remade entirely. Sold in limited numbers in selected stores, the collection was a success.

In developing the collection, the possibilities of each garment were reviewed and new circular ways of working were explored aiming to minimize resource use.

All the material was also inspected in order to determine which styles could be produced and how they could be adapted. Given the unconventional, restrained, and relatively small-scaled nature of this initiative, resulting in the necessity for a number of manual interventions, speed of communication and decision-making was impaired. Nevertheless, knowledge gained are foundational for future redesign initiatives, especially in terms of internal processes and communication. Redesign creates new flows in existing value chains, opening opportunities to recover and add value to garments rather than disposing of them.

Extending the service life by redesigning garments into new commercially viable and unique products is yet another step towards a more sustainable and resource-efficient way of creating fashion.

STRENGTHS	Excellent marketing	WEAKNESSES	Time consuming to start up
	Huge interest from partners		Time consuming to choose styles
OPPORTUNITIES	Unique garments that sold out fast		Limited to existing material
			Internal communication
OPPORTUNITIES	Template for future projects	THREATS	Current system makes circulation of products difficult
	Activate deadstock		
OPPORTUNITIES	Redesign increases value of the garment		Difficult to calculate costs
	Contributes to a more positive attitude regarding remake		Difficult to plan
			Scale-up requires careful planning

SOURCE: RE:TEXTIL: FEASIBILITY OF FASHION REMANUFACTURING, SCIENCE PARK BORÅS, 2018



Potential value/benefits

Environment - Resource efficiency! Using an existing stock of unsold clothing is a clear win for both the company and the environment, as it replaces newly produced garments.

Customer/society - Designing the clothes so they have a higher value than the original item makes the customer think differently, potentially raising the status of redesigned garments in the future and thus contributing to lower demand for new garments. As with other similar projects, unique products enable distinction, strengthening the user's sense of identity, making it more likely he/she will cherish it.



PHOTO: LINDEX
PROJECT: LINDEX RE-DESIGN

Remake Gina Tricot

Gina Tricot launched its remake collection Gina Tricot Upcycle in autumn 2019. Together with Re:textile, Textile & Fashion 2030, and XV production, they undertook a redesign project using surplus and faulty garments. At the Big DO design hackathon, designers from Gina Tricot and elsewhere were invited to create a new collection following a number of predetermined design principles and UN's Sustainable Development Goals.

Overproduction is highly destructive yet common practice in the fashion industry, which can partly be alleviated through remake. Unsold garments left unused, either due to overproduction or returns and samples, need to go somewhere and serve a purpose.

Gina Tricot chose to use a microfactory set up temporarily in the DO-tank Center at the Textile Fashion Center in Borås. The microfactory served as a small-scale textile production line, covering all the necessary steps from the drawing board and cutting table to stitching and finally photographing the finished product.

Jenny Lundberg, a designer at Gina Tricot, had this to say about the Big DO: "The Big DO week was a fantastic opportunity for us to explore circular business models. The microfactory allowed us to test ideas, along with Anna Lidström from re:textile and XV Production, and immediately see the outcome. It feels great that just a couple of weeks after the Big DO, we've been able to launch the Gina Tricot Upcycle collection on our website."

The collaboration and production took place during the hackathon week, and certain garments were available in Gina Tricot's online store shortly after. Some of the remade garments were produced in series of two or three, the rest were one-of-a-kind.



SOURCE: GINA TRICOT UPCYCLING, TEXTILE & FASHION 2030, 2019



Potential value/benefits

Environment - The material in a remade garment already exists, making it less resource-intensive than new production. However, remaking deadstock needs to be seen as a way to compensate for malpractice, not as an opportunity to maintain overproduction and waste of resources.

Customer/society - The customer gets to wear a unique garment produced with resource-efficiency in mind. In terms of employment opportunities, new circular operations may require new (local) competencies which opens up new job opportunities.

PHOTO: GINA TRICOT
PROJECT: GINA TRICOT

Remake Elvine

In this project, re:textile explored the economic feasibility of remanufacture at the fashion company Elvine. The products used as the starting point were returned and unsold garments from earlier collections, known as deadstock. Elvine was responsible for revamping the designs and managing online sales through their own online channels. The ambiguity of the terms “remanufacture” and “remake” made it necessary for them to be split into three different steps: refurbish, recouple, and reconstruct.

Nineteen different outerwear garments underwent refurbishment, most of which were unused jackets that had been returned, receiving a new price corresponding to the laborintensity of the repairs. Once the jackets had been repaired, they were put up for sale on Elvine’s website as “Version 2.0”. In cases where the jackets were still available as new, the repaired versions were displayed alongside them, offering the customer a repaired jacket at a reduced price.

84 garments were either recoupled or reconstructed, with alterations ranging from changing the colour of the buttons to completely reworking a jacket into a waistcoat and a bag. The remade garments were presented on the website as a collection focusing on the preservation of environmental resources, using surplus material to create new design classics.

Based on this project, a feasibility study was conducted. It took into account variables such as selling price, remake cost, material cost and the price of the original garment. The refurbished jackets performed well financially thanks to the high value of outerwear. Concerning the recoupled and reconstructed garments, the study indicated that everything except the T-shirts were economically viable. Some of the products enabled a 25% higher selling price thanks to exciting and innovative design.



SOURCE: RE:TEXTILE: REMANUFACTURING OF DEADSTOCK AND CUSTOMER CLAIMS APPAREL, SCIENCE PARK BORÅS, 2020



PHOTO: ELVINE
PROJECT: ELVINE

Potential value/benefits

Environment - When already produced material is used to create new products, natural resources are preserved.

Customer/society - The customer gets a garment with a quality that matches a new one. More local jobs are created to maintain a circular flow, which include collection, handling, manufacturing, and distribution. The shortage of textile material is slowly becoming a reality, making it important for companies to switch to more circular flows as soon as possible.

Critical success factors for upscaling remanufacture

- Creative designers who see opportunities based on product, customer and commercial perspectives.
- Availability of materials.
- Material that reaches desired quality levels and meets specifications.
- Flexible manufacturing capabilities
- High demand for the products.
- High value of the end product, to cover production costs.

Innovation opportunities - Create new business models around reuse. Collaborate with collection organisations and other fashion manufacturers to ensure the flow of material. Develop new technology for disassembly of garments as a pre-production step in the remanufacturing process. There have been few studies on this subject and knowledge of the circular value chain and business model is thus limited, offering scope for more research.

4. Conclusion and reflection

The steps presented in this report provide companies with a route to establish their own strategic framework and guidelines for achieving circularity and cutting their environmental impact through design.

However, there is no silver-bullet for success, and each company must understand the full effects of choices made and take responsibility for them by establishing the right competencies, analyze how to best achieve circularity goals and develop strategies and guidelines accordingly. An example is H&M that, during the fall of 2021, launched its Circular-framework for implementing circular design principles.

Yet well-developed strategies are not enough. The key lies in the implementation – what you actually do. We would therefore like to close with seven reflections that summarise what it means to work on circular design, and hopefully provide new perspectives. This text was published in winter 2021 on the Science Park Borås website and was originally written as a summary of several panel debates within the Conditional Design project. The text has since been reworked for this report, as we believe it provides inspiration that could help with the success of circularity ambitions.

1. Right design and material for the right application

The only time of the day we don't seem to use a textile is while standing in the shower, but even then, the towel is likely a mere arms-length away. This just highlights the integral role textiles play in our lives, serving a wide variety of functions. For this reason, it is complicated to determine whether a specific textile is sustainable or not; it depends on the item's area of use, production methods and business model – to name but a few of the perspectives involved.

Product design that is fit for purpose is thus step one, and the question you need to ask yourself is: *do we even need the product?*

2. Think long-term

At product level, long-term and strategic thinking is important to create products that enable business opportunities into the circular system. Being able to capitalize on the services, reuse and recycling associated with your product is vital for achieving profitability in the circular economy. Earnings could potentially be higher over time, compared with the conventional way of simply earning money from the initial sale. However, it all comes with some uncertainties.

Will we be able to achieve the expected earnings in the circular system?

How do we manage this risk? Both as an individual company and as an overall system?

Future-adaptive design enables us to minimize the risk of physical degradation, and functional or aesthetic obsolescence in products. In a circular systems, design therefore becomes a strategic tool for reducing business risk. Such approaches to circular design are explored more in-depth in the research being done by Tomas Nyström at RISE Research Institutes of Sweden.

How can this be applied and scaled up in the textile and fashion industry?

Financial risk is an interesting subject when it comes to upscaling and transformation. The financial market – a lever for transformation – has a drive to maximise the return on invested capital. Predictability and minimisation of risk are key factors here, but in a changing landscape it is difficult to determine what ROI one might expect. It is therefore important for the playing field to be rigged in support of the sustainable transition, which will require incisive policies. At the time of writing, the entire industry is tensely waiting to see what the textile strategy within the European Green Deal will look like, and what regulations and directives will then follow. We can only hope this will make it easier for financiers to see the value and invest in green alternatives.

3. Collaborations

Collaboration and co-creation, both upstream in the value chain and with customers and consumers in the market, are vital for success. The key is to understand the needs of the end user and to find the right use for resources that are currently treated as waste. It is also important that all the necessary skills to carry out the transition and transformation are not concentrated in one place, but scattered along the value chain. This applies to both incumbents and newcomers.

4. The regenerative perspective

This is a perspective that does not get enough attention, with the primary reason likely being our inability to deal with its complexity. Nevertheless, we cannot sidestep the issue of resource extraction for example, how can material production ensure the preservation of ecosystems and biodiversity? The way we run the textile industry today, polyester is often valued the best raw material when weighing up environmental and economic criteria's in life cycle assessments. However, as an oil-based product, polyester cannot contribute to the regeneration of ecosystems. So polyester-based products need to integrate in technical cycles so they can be used to the fullest and recovered at the end of their lifetime. It is thus extra important for us to adopt a regenerative perspective when producing the raw ingredients for natural materials. Swedish wool, which today isn't yet being fully utilized, is one of those examples. Swedish wool stems as a by-product from the meat industry as well as eco-system services such as open pasture lands. When refined appropriately, Swedish wool has the potential to be used in high quality products while at the same time be recyclable several times. Cotton can also be grown using regenerative practices: proof of this can be observed across the world.

5. Customers and customer behaviour

Although we cannot place challenges relating to the eco-system solely on the consumer, it would benefit the entire industry if individuals were to follow and act according to the principles of circularity more actively.

Evidence of consumer-level misconduct is perhaps best seen at textile-sorting centers, filled with high quality garments in good condition yet worthless on the second-hand market due to their uncleanliness, and therefore instead destined for incineration. We therefore need to change attitudes and respect for textile products by widening our knowledge and understanding of the environmental impact from the textile value chain, and the opportunities inherent in a circular system. One approach would be to include these perspectives in the school curriculum and to incorporate such thinking into many different subjects. This is one of the proposals in a report drawn up for the Delegation for Circular Economy by the Circular Economy expert group and published in December 2021.

At the same time there is a need for behavioural changes in areas other than private consumption. Single-use textile products are still common in certain contexts and could be replaced with more resource-efficient solutions that are just as good and fit for purpose. This requires a different approach and new directives in public procurement.

6. Innovation

Innovations need to be consistent with a coherent vision of a sustainable future – proactive, rather than being mere quick-fix reactions to current issues. Fortunately, there are many such examples among the immense array of start-ups that are cropping up today, especially within fields such as information management that aim to facilitate circular material flows. Other examples are smart textiles that can be used to create “dynamic sizes”, enabling garments to change fit and size on the fly. Such a solution would not only increase the attractiveness and usability of the product, but also improve its viability as a “shareable object”.

While we are seeing many technical solutions take shape, there remains a lack of concrete innovation on the design front, i.e. the way we use and configure different components into smart and sustainable products and services. The need for handy tips to guide designers, product developers and innovators is met by the “Designers Toolkit”, developed by Science Park Borås as a way to link up practical product design with various aspects of business models and the need for surrounding infrastructure and systems.

7. “Mindset Growth”

Rarely do our personal perspectives perfectly correspond with the physical reality. We need others to make sense of the complex situation that we are living in. New perspectives on our challenges pave ways for innovative solutions. Individual and industry-level growth and capacity to change fuels itself on open-mindedness and the careful consideration of various unique ideas. “Mindset Growth” is what we like to call it.

One of the ways in which we could bring about a shift of perspective in the industry, or rather, a “wake-up call”, could be by inviting employees within textile and fashion to a textile sorting facility responsible for the stupendous amount of waste that is left behind, to show, to the naked eye, the repercussions of dubious design-methods and cost savings, and how such short-term philosophies nullify any involvements with circular models and second-hand markets. Countless garments today are discarded, piled up, and exported due to low quality levels. Bumps, twists, or other kinds of defects contribute to increased costs and lost revenues in the garments’ entire life cycle.

Who exactly is responsible for this financial wastefulness?

High fashion and showpiece garments worn by celebrities on the red carpet often serve as a catalyst for new cultural and aesthetic paradigms. Imagine a culture that celebrates, rather than denigrates, repeated wears of the same garment among celebrities in its anticipation to witness its evolution since the last time they wore it.

With these reflections in mind, we would like to send the reader off with a few concluding questions. What would it actually take...

...for companies to begin buying back garments for reconditioning and resale?

...for more investment to be made in smaller-scale technologies and companies that have less of a track record but are strategically important for the transition?

...for us to see used garments as more valuable than new ones, kind of like some works of art become more valuable with age?

...for us to begin treating products as a platform for services?

...for us to include the total cost in the product costings, not just those that occur before the initial sale?

...for us to learn from the culture in the outdoor sector, where a tear in the fabric or a repair bears witness to something desirable, an intrepid adventure?

...for revenue over time to become more important than the next quarterly report?



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CIRCULAR BUSINESS TOOLKIT



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