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know-how for enabling a systemic change

During 2017 with the support from Mistra Future Fashion four doctoral theses were finalized, each and everyone adding valuable new knowledge across the ecosystem for clothes, on ‘How to Design’, how to accurately assess footprints’, how to evolve sharing economy’ and how to advance in textile to textile recycling. Eight academic articles and nine reports were published. Innovative ground breaking solution for textile to textile recycling of polymer fiber blends like the Blend R, wind process were revealed, and Design Strategies were put in practice via the industry imbedded Circular Design Speed project at the residence of Filippa K.

39 research tasks were active, engaging 46 research scientists in collaboration with a pool of 10 industry partners. Results were activated and disseminated via partnerships with international fashion industry networks like Fashion for Good, Ellen MacArthur Foundation and Sustainable Apparel Coalition.

Redesigning a system takes it start in understanding the lifecycle of a product, via so called Life-cycle assessments, LCA.

What does a new system look like and what type of Mindset do we need in the future? These are the questions that Mistra Future Fashion deals with. Redesigning a system takes it start in understanding the lifecycle of a product, via so called life-cycle assessments, LCA. Historical lack of available data meant that analyses have been tough to perform, leading to incomplete generalizations and myths. Pokey to address this, our researcher Dr. Sandra Ross at SwereaIVF completed her doctoral studies in 2017 by providing more comprehensive LCA of fashion, including for first time its chemical impact. Besides gaining better understanding, the data can support thousands of practitioners in their decision-making via global LCA databases.

New definitions of ‘fast’ and ‘slow’ fashion are needed in a circular system. The team at University of the Arts London explores ‘Speeds’ in relation to materials and product use, guided by LCA data. For example – ‘Slow fashion’, how services like repair, re-selling, re-design and sharing can activate garments to its full potential in use. On the other end of the spectrum, fast fashion, the concept ‘who fast forward’ likes fast lifecycle in a sustainable way. Bio-based materials like paper textiles (that feels and act like fabric) are explored together with RISE for allowing fast sustainable production and consumption. By limiting times of use to only three, no washing is needed and can be safely disposed in a recycling system. A concept not relevant for all types of products, but for certain usage needs.

New definitions of ‘fast’ and ‘slow’ fashion are needed in a circular system.

LCA reveals the high environmental footprint that lies in the production steps today. Ongoing advancements of technology will address these as well as providing smarter, leaner and more sustainable processes. For example, by exchanging traditional cutting techniques to ultra-sound technique microplastic shedding from fabrics can be minimized, which is proven in a recycling process conducted by SwereaIVF.

By using a t-shirt on average of three times longer the footprint would decrease by 68%. Why Users’ most sustainable action is to prolong the lifetime of existing clothes. Consumer studies by Copenhagen Business School (CBS) confirm that even if we keep the same fashion consumers we need sustainable alternatives and hard to find. Consequently they need to grasp the role of new business models, like clothing library, leasing, second-hand. Understanding the underlying stimul of consumption plays thus important role for new business services, especially when aiming for a shift of ‘Owner-Ship’ to ‘Access’. Consumer insights on habits of fashion consumption and sustainability, such as gained from CBS studies, serve as base when designing more efficient scenarios for nudging consumers.

Every year the volume of approximately 100 million tons fiber are produced. The need to find alternative sustainable sources in large volumes is an essential challenge. Perhaps new sources of fibers in combination with better utilization of textile waste could be a potential future solution. In the year six year long “PolyCotton” project revealed breakthrough results on cotton polyester blend recycling, developed by Claessens, RISE and forest company Södra. It was named the “blend Re-win” process. This was enabled thanks to dedicated doctoral studies by Dr. Anna Palhe on characterization of fibers from used cotton sheets. Globally there are overall a few promising processes emerging, targeting different fibers and mixes. Hopefully within a 10 years’ time frame the textile recycling industry has fundamentally changed.

Efficient policies play important role for system progression. During 2017 team at IVL, BSE and PlanMiljö investigate policies for new business models, extended producer responsibility (EPR) and refunded Virgin Payments (RVP). The aim to shed light on potential impacts and act as guide to fashion industry stakeholders as well as governmental bodies in their decision making.

Today’s textile to textile recycling holds complex challenges but luckily promising recycling processes are on its way.

The new system sighted, is ideally guided by LCA data, user centered with many available systems, designed and developed within sustainable operational frames. The industry stand to gain in terms of business opportunities by supporting the users’ multi-speed wearables with a mix of short-life and long-life garments, new and second-hand, rented or borrowed. This, is to say we as citizens of this planet can enjoy fashion in an engaging and positive way.
research for sustainable fashion

a research program with a vision of enabling systemic change leading to a sustainable fashion industry and society

sustainable fashion

The program focuses on environmental and climate effects caused by global fashion sector and the changes required for future sustainable operations. The research applies the principles of circular economy and is structured around four themes: Design, Supply Chain, User and Recycling.

unique system perspective

The program holds a holistic system approach for the fashion value chain, from fiber to recycling, and how it needs to change in order to become more circular. The research is cross-disciplinary, allowing comprehensive analyses and insights. New knowledge is verified in a holistic context, ensuring sustainability also from a system perspective.

platform for sustainable fashion

The program research rests on engagement with its consortium: research institutes, universities, government agencies, non-governmental organizations as well as companies within the textile value chain, from forestry, pulping and textile manufacturing to fashion retail and recycling. The partners set the research scope, participate in the research with intelligence, resources and materials, and agitate for implementation.

results leading to global competitiveness

Expected results are scientific knowledge and novel solutions that enable positive change in the fashion sector in terms of its environmental performance and its global competitiveness.

vision: enabling a systemic change of the fashion industry

why

The global fashion industry faces multiple challenges when meeting modern requirements for sustainability, traceability and transparency. Today’s fashion industry means severe environmental impacts from production, hazardous substances in garments, mass consumption and generation of large volumes of textile waste. Majority of today’s fiber production is unsustainable, either as conventional cotton that requires high amounts of pesticides and water in places where water is scarce or synthetic fibers such as polyester which is made of our planet’s fossil resources. The issue is also about providing the high volumes required. A challenge that will get worse with the continued global population growth. An annual volume of 100 million metric tons is estimated to be needed by 2050 (Eichinger 2012), and very few nascent sustainable alternatives can meet those demands. However, new alternative fibers sources is not enough since 70% of a garment’s climate impact stems from the total production phase, such as fiber production, yarn production, weaving, dyeing, finishing, sewing, surface treatments, etc, due to its energy, water and chemical usage. New sustainable fibers in old production processes challenges the output as sustainable products. The overarching issue that needs to be addressed is the imbalance in efforts needed for production vs usage. In general there is high environmental impact required for a short user phase. Furthermore, modern consumption habits generate massive textile overloads in the market and ultimately also problems with waste. This is result of the linear economy model, where “take, make, waste” represents a broken design right from start.

how

A new model is required in order to utilize the resources in the most efficient and sustainable way, and to minimize (and hopefully eliminate) waste. Policies are required that prompt the development of new market and business models allowing consumer behavior to be changed. With the aid of information flow and digital technology developments, new consumer habits and demands may appear, along with advances in sustainable production processes and techniques, which also assume less geographical dependence.

We need textile fibers that are sustainable, but comparable in quality and price to existing, non-sustainable fibers. A circular model will involve more advanced design processes incorporating sustainability impact procedures right from the design phase – procedures that are based on intended usage and duration of use, which ensure optimum usage via re-use and which enable separation and the regeneration of new fibers at the point of disposal.

We hope to see a future with recycled fibers from textile waste, new sustainable production techniques and new consumption habits leading towards new services such as leasing, re-design and borrowing, which will encourage flourishing new business in re-use, collection, sorting and recycling. This will mean available alternatives and enable more sustainable actions.

expected results are scientific knowledge and novel solutions

70 percent of a garment’s environmental impact lies in the total production phase

Roos, Sandin, Zamani, Peters, 2015
recycling

We develop knowledge and new processes in recycling methods and the impact of post-consumer textiles in order to provide guidance on necessary steps to enable sustainable textile recycling.

design

We explore and evaluate the environmental potential of the design and user potential of short-life vs long-life garments, and the full spectrum in between, to find the most suitable choices for a circular textile economy for different types of garments and uses. Expected outputs will be recommendations, guidelines and tools for how to design for resource circularity.

user

We make recommendations on how to encourage sustainable consumer behavior and to increase user engagement in sustainable consumption. Specifically, we develop recommendations for increasing services for extending the life of garments, reuse, and second-hand consumption.

supply

We identify the necessary actions in textile and garment supply chains to enable a circular economy, guidelines for governance on how to transition to and sustain a circular textile supply chain.
our partners

research partners involved in theme researchers output

**BOKU**
- Recycling
- researchers: Doris Raittus
- output: Chemical engineering

Chalmers University of Technology
- Design
- Supply
- Recycling
- researchers: Greg Peters, Anna Patine, Richard Arvidsson
- output: LCA, Chemistry, Fiber prototypes

Copenhagen Business School
- Design
- Supply
- User
- researchers: Wencie Owosz, Ebbe E. Pedersen, Kristian Sjø Nielsen
- output: Consumer behaviour, Business models, Local production

IVL, Swedish Environmental Research Institute
- User
- Recycling
- Supply
- researchers: Maria Shaher, Hanna Ljungkvist
- output: Policies

KTH, Royal Institute of Technology
- Recycling
- researchers: Per-Olof Syrén, Maria Syrén
- output: Chemical engineering, Textile fibre recycling

More Research
- Supply
- Recycling
- researchers: Björn Edman, Hanna Rammy
- output: Viscose pilot production

PlantMije
- Supply
- User
- Recycling
- researchers: David Watson, Anna Charlotte Nygård
- output: Chemical engineering, Textile fibre recycling

RISE
- Design
- Supply
- User
- Recycling
- researchers: Hanna de la Motte, Gunter Sandin, Albertsson, Helen Weál, Finn England
- output: Consumer perception, LCA

Stockholm School of Economics
- User
- researchers: Susanne Sweet, Tia Sandhiman
- output: Supply chain strategy, Business models

Stockholm University
- User
- researchers: Claudia Rodemack
- output: Consumer behaviour, Business models

Swerea IVF
- Design
- Supply
- Recycling
- researchers: Sandra Roa, Hans Lernaq, Norblom, Ziangwei Quo, Anna-Karin Kristinsson, Christoffer Jansson
- output: LCA, Microplastics, Chemistry

The International Institute for Industrial Environmental Economics
- User
- Supply
- researchers: Elliot Neth
- output: Policies, Recommendations

The Swedish School of Textiles
- Design
- Recycling
- researchers: Krista Dallmann, Rebecca Nash, Kay Pethel, Clara Vlach
- output: Strategic design, Prototypes, Design Guidelines

University of the Arts London
- Design
- Recycling
- researchers: Amie Viso, Olga Paukovskaie
- output: Design, Textile technology
The Mistra Future Fashion program is a consortium whose partners stand behind the program vision and actively contribute to achieving the program vision and goals.

The program covers a broad range of expertise and involves the most established experts and progressive leaders within their respective research fields. The research is organized around four themes and involves researcher partners from Sweden, Denmark, and the United Kingdom.

The industry partners involved are a mix of relevant stakeholders from across the value chain such as producers, designers, retailers, waste managers and NGOs.

The consortium has two levels of industry partnership; Stakeholder partners, and Advisory Stakeholder partners.

Stakeholder partners include in-depth involvement in research tasks with inputs such as expertise, information-sharing, resources, equipment and materials.

Advisory Stakeholder partners actively follow research progress and provide input on shaping the agenda, but do not engage in individual research tasks.

“We deeply appreciate the holistic view of Mistra Future Fashion considering all parts of the textile value chain from designer to user and even beyond. Close collaboration is paramount when it comes to changing a whole industry.

With the Refibra™ fibre, Lenzing AG has taken a big step towards closing the loop in the textile industry. The research conducted and results obtained within Mistra Future Fashion help us to improve by better understanding and getting different views on the challenges ahead to arrive at sustainable fashion.”

- Dr. Christian Weilach
Global R&D, Pulp and Biorefinery Technology
Lenzing, Aktiengesellschaft

“Fashion for Good is the global platform for innovation, made possible through collaboration and community. Mistra Future Fashion is a key partner of ours and we highly value their focus on innovation and their approach towards systemic change. In 2017 Mistra’s expertise on chemical recycling was hugely beneficial in helping us evaluate innovations that had been invited to join our Scaling Programme. The Mistra Future Fashion team combines a strong academic background with a systemic view - enabling the industry to foster innovation in the fashion supply chain.”

- Katrin Ley
CEO, Fashion For Good
new knowledge presented 2017

Understanding the lifecycle of a product is key in creating a sustainable industry; thus the future is dependent on a new definition of ‘fast’ and ‘slow’ fashion. How do we design materials and products that work with the current models for fashion consumption, how can this be measured and then communicated to designers? In order to answer these questions the concepts of ‘short-life fashion’ and ‘long-life fashion’ is explained in theme 1.

Focusing on ‘speed of cycle’, the aim is to better understand the challenge cycle of speed may bring to design and to prepare for the subsequent action research phase. The research includes development of design research prototypes and new materials. The aim is to develop the discourse from fast and slow pure and simple, to a level where multiple, proportionate speeds can be both understood, tested via LCA and ultimately engineered to improve the circular efficiency of a product.

The basis of the project emerged from: Textile Toolbox project during phase 1, where researchers from UAL first produced prototypes exploring circular speeds; ‘asap paper’, ‘digital seamstress’ and ‘fast refashion’. In phase two these designs have been further developed into ‘ultra fast forward’ and ‘super slow’ concepts.

In 2017 Clara Vuletich published her doctoral thesis ‘Transitory Textiles’ at University of the Arts London. The study explored how fast fashion may bring to design and to prepare for the subsequent action research phase. The research includes development of design research prototypes and new materials. The aim is to better understand the challenge cycle of speed may bring to design and to prepare for the subsequent action research phase.

theme 1: How to design for circular economy?

Designing for the circular economy requires a proactive and embedded design approach, where materials are designed with end-of-life recovery in mind at the outset.

To enable fully joined cycles of material use is understood, tested via LCA and ultimately communicated to designers? In order to answer these questions the concepts of ‘short-life fashion’ and ‘long-life fashion’ is explained in theme 1.

Paper-textile for the ‘ultra fast forward’ fashion design concept is developed collaboratively by researchers Ray Pilcher and Kate Goldsworthy from UAL with Hjalmar Granberg from RISE.

Wearable ‘paper’: the innovative 21st-century fabric has an intentionally short lifespan and can be recycled or industrially composted. Made from unbleached wood pulp and other bio-based materials, the non-woven paper is finished using natural dyes, laser surfacing, and efficient ultrasonic construction. Energy and chemicals are reduced on every stage.

With automated production, consumers could customise each garment’s colour, pattern and shape. Acknowledging that disposable fashion is the part of most wastefulness, this new material offers a more sustainable option to fast fashion.

In 2018 the final prototypes for the ‘ultra fast forward’ study made in paper-textile will be on display at the V&A museum in London during the exhibition ‘From first Nature’ opening on the 2nd June.

ultra fast forward
new materials for fashion design

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On June 8th, the first in a series of Value to Others seminars was held on the topic of strategic design thinking for circular design. The participants were a selected group of Swedish designers and fashion practitioners. As a starting point, the concepts behind the industry pilot project Circular Design Speeds with Filippa K were shared. The seminar was led by Prof. Rebecca Earley and included a practical workshop where the speed of usage for different garments was explored.

Additional Value to Others seminars during 2018 will be open to industry professionals. This is an opportunity to learn more about strategic design thinking, aiming at enabling the development of a more sustainable and circular fashion industry.

Circular Design Speeds industry embedded pilot study redefining ‘fast’ & ‘slow’

In May of 2017 Mistra Future Fashion and Filippa K announced the project ‘Circular Design Speeds’, led by Prof. Rebecca Earley & Dr. Kate Goldsworthy of University of the Arts London. The two-year project includes researching, developing and testing of new strategic design for 100% circular fashion garments. The idea is to implement insights from the research program into an existing fashion industry context, focusing on speed of use and maximizing fabric value retention in products.

The Circular Design Speeds study consciously considers the life of fabric, production processes and business models through a holistic design process. This may be through extending the life of an existing garment by design interventions over time, or through the development of hyper-recyclable short-life products, enabling efficient recovery of virgin fabrics over multiple lifetimes. Based on this study, commercial garments will be available at selected Filippa K’s retailers in late 2018.

The greater vision is to generate meaningful and industry-aligned insights towards a systemic change in the fashion industry. In an effort to consider the entire system, the project also includes additional researchers from the Supply Chain, User and Recycling themes reviewing the scientific basis of the ideas, operational logistics and business case. For the first time design decisions will be made with quantified scientific Life Cycle Assessment data, utilizing the database created by Sandra Ross from Swerea IVF.

Value to Others recommendations, guidelines and tools for others

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Additional Value to Others seminars during 2018 will be open to industry professionals. This is an opportunity to learn more about strategic design thinking, aiming at enabling the development of a more sustainable and circular fashion industry.

“As academic researchers we see this industry-focused project – Circular Design Speeds – as essential to developing new knowledge and understanding in the areas of ‘fast’ and ‘slow’ fashion textiles. Clothes we often hope to be slow-end up being fast, and even vice versa – yet current materials are all essentially slow; they take time, water, energy, chemicals and valuable resources to make. We want to work with a brand to fully explore whether designing for product recovery and speed can help us make fashion textiles to match our different paces of life.”

– Professor Rebecca Earley, UAL
Theme 2: How to promote a more sustainable circular supply chain?

The systemic change from a traditional linear supply chain to a sustainable and circular supply chain involves a changed mindset. In a circular supply chain, the recycling facilities are not suppliers and sustainability of the production processes is ensured regardless of (outland) origin.

These issues is the focus for the Supply Theme with the aim of presenting guidance on how the fashion industry can practically reduce carbon emissions, water usage and the use of harmful chemicals.

LCA database including chemical impact

In February Dr Sandra Roos defended her dissertation; “Advancing life cycle assessment of textile products to include textile chemicals”. The study is the first of its kind since the assessments includes the entire life cycle of a garment, from extraction of raw materials to product disposal, including chemical impact.

Via this report and published article, Mistra Future Fashion makes a strong scientific contribution directly into the on-going methodology development of LCA and toxicity. The research accounts for new knowledge, like comparing quantitatively the eco-toxicity impacts from the cotton cultivation and the wet treatment. For example, if we look at direct emissions of toxic chemicals, the wet treatment is likely to give 20 times more damage than the cotton cultivation. In total 92% of the toxicity impact steams from the production phase.

Furthermore, the results show that 70% of a garments climate impact stems from the total production phase, such as fiber production, yarn production, weaving, dyeing, finishing, sewing, surface treatments, etc. due to its energy, water and chemical usage. Within the boarder of consumer choices, 22% of the total impact steam from transportation and only 3% from garment care. Thus, taking the bike to the store reduces the climate impact of a garment at a greater extent than washing at low temperatures. This new data presented highlights the importance of considering the entire value chain when assessing a garments environmental footprint.

At present, both fashion companies and consumers experience challenges in understanding what impact clothing have due to limitation of facts. The major advantage of LCA is therefore that it provides a quantitative measure of the environmental impacts, for example climate change and water scarcity. This means that it is now possible to calculate the effectiveness of various improvement measures. Using the data designers, buyers, fashion brands and producers can make relevant decisions in regards to everything from fiber and production methods to shipping. In addition, consumers and other stakeholders can be offered a new sense of transparency and a receipt of a garments environmental impact.

In 2018 Sandra Roos will be taking the next step in her research by converting LCA data into useful tools for the fashion industry together with stakeholders.

“We are very proud of the work that Sandra Roos has performed within life cycle assessment of textile products in regard to including textile chemicals used in the production processes. The response has been overwhelming and the results will be used to create a practical tool for the textile industry.

There are many challenges in the textile area, but also great possibilities of reducing environmental impact and increasing resource efficiency. We have actively participated in the work behind the national initiative – the Swedish Sustainable Fashion Wonder, which is an important step towards a circular economy for textile materials.”

-Mats Lundin, CEO at Swerea IVF
“Turning from a linear to a circular resource model for fashion and textiles will be crucial to secure a prosperous future of fashion within the planetary boundaries. Mistra Future Fashion with its holistic perspective and research is an important actor in the transition and the acceleration of the systemic change that needs to happen towards a circular fashion industry.

The H&M group has set a vision to become 100% circular and we are convinced that a circular resource model is the only way forward. We see that we need to change the way that fashion is made and used in order to allow development to happen in a way that the planet can afford. During 2017 we have seen great progress in the Mistra Future Fashion research program in the areas of preventing microplastic pollution, recycling and separation technologies for textile fibers, LCA studies and circular design to mention a few. All are very important stepping stones towards a circular fashion future.”

-Cecilia Strömblad Brännsten
Acting Environmental Sustainability Manager /Circular Economy Lead at H&M group.

In early 2017 researchers at Swerea IVF began a study on microplastic shedding. This study was one of the first steps taken in a larger project and describes an experimental evaluation of whether the shedding of microplastics from different types of polyester fabric is dependent on construction parameters. The study included three active industry partners: H&M, Filippa K and Booo. Working closely with the industry makes it possible to efficiently identify practical issues and frame recommendations ready to be implemented.

Micro-sized particles of plastics, so called “microplastics” are causing an environmental problem in marine and coastal waters. The oil-based microplastic particles attract contaminants that are normally not soluble in water. When the microplastics enter animals and plants in the aquatic environment, they bring contaminants with hazardous properties with them. Since the fashion industry is identified as one of the origins of microplastics the relation between polyester fabric properties and microplastics shedding needs to be further examined.

The study showed no support for the assumption that fabrics made of recycled polymers shed more than fabrics made of virgin polymers. It might instead be assumed that the concern of fleece material from recycled polyester is a main cause to the microplastics problem, is explained by the fact that fleece is a material that has traditionally been made from recycled polyester bottles.

In addition the study shows that using an ultrasonic cutting machine instead of a regular scissor when cutting the fabric reduces the shedding significantly. When testing the two methods a total number of 890 fibres were shed from the ultrasonic cut fabric and 1927 fibres were shed from the scissor cut fabric.

In 2018 the study continues in the project ‘MinShed’, lead by Christina Jönsson at Swerea IVF with an added number of industry partners.

recommendations:
• develop a standardised test method for microplastics shedding from fabrics
• differentiate between fibre and other microparticles that shed from fabrics
• investigate whether fibres or other microparticles are most relevant for the environmental impact
• remove microplastics from fabrics already at the production stage
• if microplastics are collected (preferably using dry methods), they should be disposed of in a safe way.

shedding reduced if:
• brushing and/or shearing is reduced
• ultrasonic cutting is applied in the cut & sew process
• microparticles on fabrics are removed already at the production stage
user

theme 3: How can users contribute to a more sustainable fashion system?

Sustainable fashion consumption is the research context of Mistra Future Fashion. The research is guided by the two underlying themes: 

1. The user perspective: how to make users behave more sustainably
2. The business perspective: business models for new, upcycling and sharing

Three main research areas of interest from a research context of Mistra Future Fashion

Sustainable fashion consumption in the

perspective: how to make

business models

that earns the least, which consumes mostly

end of the spectrum is a consumer segment

were divided into five segments. At the low

from 4617 adult consumers (aged 18-65)

within purchase, use and maintenance, and

The research sheds more light on patterns

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communications tools to nudge consumers

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attitude was collected and

data enables understanding of consumer

attitude for clothing made of material that is more

environmentally friendly than conventional fabrics. These observations suggest several promising directions for environmental interventions tailored toward specific consumer segment.

The design and implementation of any strategy emerging out of this data, should take into account that no one message can suit all consumer groups; to be successful, interventions must be adapted to each segments’ consumption patterns.

What are consumers’ intention and use

of new business models such as clothing libraries, leasing agreements and second-hand? How do consumers behave in their fashion consumption and in particular in terms of sustainable fashion? To answer these questions comprehensive data on consumer attitude was collected and analysed. The data enables understanding of consumer attitudes with the goal of finding suitable communications tools to nudge consumers to act more sustainably.

The research sheds more light on patterns

within purchase, use and maintenance, and
discard phases by analyzing unique data

from 4617 adult consumers (aged 18-65)

living in Germany, Poland, Sweden and the

U.S. Based on their answer the respondents

were divided into five segments. At the low

end of the spectrum is a consumer segment

that earns the least, which consumes mostly

budget brand clothing and are least open to

alternative more environmentally friendly

business models such as fashion leasing

or clothing libraries. At the other extreme

lies a small segment that earns the most,

engages in high consumption of medium or

premium brand clothing and is most open to

alternative business models.

In addition to the segments’ different

purchase behavior and a varying openness

to alternative business models, the research

identify differences in willingness to pay

for clothing made of material that is more

environmentally friendly than conventional fabrics. These observations suggest several promising directions for environmental interventions tailored toward specific consumer segment.

The design and implementation of any strategy emerging out of this data, should take into account that no one message can suit all consumer groups; to be successful, interventions must be adapted to each segments’ consumption patterns.

Across all four countries, consumers were unlikely to use clothing libraries and fashion leasing

reselling clothes online and traditional repair services were the most popular new business models with consumers reporting to be somewhat likely to use them in the future

consumer survey

field report mapping user attitudes

What are consumers’ intention and use

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“fashion” and “style”, and

well-being the relationship between them

Many consumers attach a high degree of importance to decisions relating to what clothes to purchase and wear. These are relevant to understand when nudging sustainable consumption. To give out these psychological implications, a study explored the conceptual distinction between clothing consumers with a fashion and style orientation.

The findings of this study tell, through the four-country consumer survey, clear support for the conceptual distinction between a ‘fashion’ and “fashion” orientation. Moreover, the fashion-oriented consumers report a higher endorsement of materialism and lower levels of subjective well-being than style-oriented consumer. Interestingly, the difference in subjective well-being between these two orientations is mediated by materialism. While materialism and

fashion orientation partly overlap, fashion orientation is still conceptually distinct from both style orientation and materialism. This could be, for example, by following the latest fashion trends through alternative means of consumption such as renting or lending.

Consumers with a style orientation exhibit higher levels of subjective well-being than fashion-oriented consumers.

Though style and fashion is often used synonymously, they have divergent meanings. In relation to clothing, style is any distinctive mode of dressing, whereas fashion is the style prevailing at any given time. A style evolves slowly and is reflective of a person’s identity and way of life. Fashion, by contrast, is temporary, ever-changing and resonating, newswhip.

clothing libraries

assessing using LCA data

A 2017 study assesses the environmental benefits of clothing libraries. To achieve environmental gains, the study quantitatively demonstrates the importance of substantially increasing the garment service life and considering the logistics. The logistics is important because the risk of problem shifting increased customer transportation can completely offset the benefits gained from reduced production. This means that the location of clothing libraries matter and that collaborative consumption may not be suitable for all kinds of clothing. Life cycle assessment (LCA) is used to explore the environmental performance of clothing libraries, as one of the possible ways in which collaborative consumption can be implemented, and advantages and disadvantages are compared to conventional business models.
In present fashion system there are many opportunities for businesses that derive value via extending the active lifetime of a garment. A large number of businesses have arisen in the past few years attempting to do so through for example leasing or re-design. However, these businesses face a range of economic, legal and capacity obstacles which they need to overcome if they are to expand from niche to mainstream. Government can assist businesses in overcoming these obstacles through adoption of policy instruments.

In study ten potential policy instruments for overcoming these obstacles were selected from a wider pool and evaluated. Some of the instruments would require regulation change; others are economic or information-based.

A small group of stakeholders plotted potential magnitude of impact against doability. The results found that there is no silver bullet that would both have a high impact and be relatively easy to get accepted and implemented. However, the stakeholders found the following instruments most favourable:

- reduced VAT for reuse, sharing, second-hand, repair, leasing
- support for second-hand in central shopping malls
- start-up transition funding and government-supported knowledge hubs
- wage subsidies targeted at these models

All instruments explored can be carried out at national or local level in Sweden, rather than being implemented at EU level. Moreover, there is strong level of synergy and compatibility between the instruments. As a package deal they could provide considerable support to business models aiming at extending the lifetime of garments.

Measures of success in this report include making profit (or break-even in the cases of non-profit initiatives), increased awareness/engagement from customers/citizens and increased active lifetime of textiles. Based on the collected stakeholder views, potential success factors for business models for increased reuse, collective use and prolonged lifetime of textiles were identified:

- access to (free) materials
- access to volunteers
- efficient logistics
- finding the right material/garments
- finding understanding from investors/financial insititutes
- good agreements with suppliers
- keeping the customer interested
- rapid establishment of the brand/business model
- time since establishment

In 2017 Kirsti Reitan Andersen published her thesis ”Stabilizing Sustainability in the Textile and Fashion Industry” at Copenhagen Business School. The thesis investigates how organizations can change towards practising sustainability, focusing on the potential of taking a design approach to bringing about processes of organizational change. Questions explored are “For what reasons can organizations within the textile and fashion industry change towards practising sustainability?” and “How is design thinking being mobilized within current conversations about organizational change towards practising sustainability?”

From another point of view, the question of how to extend the active lifetime of a garment can be evaluated from a business model perspective. An additional study was conducted during 2017 evaluating business models within reuse, collective use and prolonged lifetime in order to define drivers, strengths, weaknesses and factors of success. What business models can really extend the lifetime of a garment?

This report highlights the obstacles and possibilities of present industry initiatives. Results derive from stakeholder interviews. Low awareness amongst consumers and suppliers is identified as one of the key difficulties. Furthermore are business models within leasing, repair and re-design essentially dependent on access to free material and voluntary workers in order to make a profit. Stakeholders see a current lack of incentives and policy measures supporting these businesses. By emphasizing these needs we can take the next step forward.

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recycling

The demand for virgin textiles and textile products is expected to increase significantly with global population growth and a rapid increase in the global middle class. At the same time, the production of textile fibers is responsible for significant global impacts. The textile industry is facing a major future challenge in securing supply and environmental impacts for which it is responsible.

At present cotton and polyester constitute more than 90% of the materials used in the textile industry, thus the industry urgently needs to make more effective use of textile fibers at every step in the value chain. Therefore, the aim of Theme Recycling is to explore post-consumer cotton and polyester; in particular by assessing how cotton and polyester mixtures can be separated and recycled.

blend re:wind - a new method for separating both cotton and polyester from a cotton/polyester blended textile

In November the blend re:wind recycling process was presented. For the first time ever there is a method for separating both cotton and polyester from a cotton/polyester blended textile. This revolutionary process is the result of six years research and the results are crucial for large-scale commercialization and future production of recycled textile.

The blend re:wind innovation has been developed within Mistra Future Fashion by researchers at Chalmers and RISE together with the forest industry company Södra.

Cotton and polyester fibers are separated in a chemical process and divided into three clean outputs; cotton and the two components of polyester, one in solid and one in liquid form.

The cotton is then used for making new high quality viscose filaments and the polyester can be rebuilt into new strong fibers. This produces circular product streams and means that we are one step closer to closing the loop for textiles.

A doctoral thesis project by Dr Anna Palme set the groundwork for the innovation. Understanding how cotton is affected by wear has been fundamental in the project and therefore Dr Palme has done extensive studies of worn cotton/polyester sheets discarded from hospitals. By using the cotton extracted from the worn sheet, high quality viscose filaments could then be produced.

A significant advantage of the Blend re:wind process is that the separation takes into account existing industries. The goal has always been to integrate with existing forest and chemical industry or recycling initiatives. Anna Palme clarifies:

"The Blend re:wind viscose has the same quality as filament made from commercial dissolving pulp generated by the forest industry and used in viscose production. This means that the material can hopefully be easily integrated into these processes. The separated polyester can be polymerized into a high quality product and is suitable for integration into existing industry. There are already established collaborations with industry actors, and experiments are being carried out."

- Dr. Anna Palme
Chalmers University of Technology

"The new process Blend Re:wind is an important step in making the textile value chain more circular."

- Mats Wallin
Mgr. Science Relations at Södra Cell AB
EPR policy
fiber-to-fiber textile recycling

IVL, Swedish Environmental Research Institute (IVL), the International Institute for Industrial Environmental Economics (I2EE) and PlanMiJa have investigated policy options promoting such fiber-to-fiber recycling of textile wastes. The ambition is to contribute to and broaden the discussion regarding potential policy measures in the textile field as well as potential elements that can be included in such policies.

Ten policy measures promoting fiber-to-fiber recycling of textiles were identified and described. Two policy measures were selected for impact assessment: mandatory extended producer responsibility (EPR) and reduced virgin payments (RVP). In order to gain industry insight stakeholder views on the identified and assessed policy measures were collected in a policy workshop and via an online questionnaire.

The results shows that mandatory EPR and a RVP system have large positive impacts on fiber-to-fiber recycling as well as overall recycling of textiles. Researchers see a need to broaden the scope regarding potential policy measure, both upstream and downstream improvements achievable with the right scope and design of a mandatory EPR. Furthermore, a system for reduced virgin payments would contribute to closing the loop for textiles.

An important aspect for a smooth and solid implementation is that a newly introduced system is accepted by as many stakeholders as possible. This makes it crucial for producers to consult with existing actors regarding the new proposed systems. A change of systems and change of mindset is needed.

In 2016 The Swedish Environmental Protection Agency (EA) proposed two targets regarding textile waste aiming at reducing the amount of textile waste and at increasing reuse and recycling of collected textiles. Reaching the targets would more than double the amount of separated collected textiles in Sweden and more than quadruple the recycling of textiles. In order to reach this proposed target it is assessed that policy measures promoting fiber-to-fiber recycling of textiles are necessary.

re:mix
separation and recycling of elastane & nylon blends

Textile blends containing elastane and/or nylon are very problematic in a recycling process. Nevertheless, these materials are growing in the market and can be found in for example stretch jeans and leggings. Therefore, new recycling solutions are highly sought after.

The Re-Mix project undertakes this problem with the ambition to accelerate the transition for the textile industry towards a circular economy. The project partners identified two separation methods, which could be used in combination, 1) a melting of synthetic fibers; and 2) design of new specific enzymes that will act as biocatalysts for the degradation of a specific polymer that further facilitates the reformation of the polymers. The method provides nylon or elastane pellets that can be used as raw materials in processes such as spinning and compression molding. The first phase of the project, including mapping existing market possibilities were completed in September.

In late 2017 Re-Mix entered phase two where focus is on an enzyme design in combination with melt-fractional precipitation. The project was granted further funding from the ReSource, continuing until June 2018. Re-Mix researcher on enzymatic design, Dr. Per-Olof Syrén at KTH and KTH’s partners has also received Flagship funding for “TexZymes” to further explore the enzymes that may be relevant in Re-Mix.

Partners within Re-Mix II are BOKU, Bob Design, Fearin, Fearing, Houdini Sportswear, I-Collect, KTH Royal Institute of Technology, Re:Mix, RISE, Swedish Stockings, TexZymes, Swerea IVF, Texalid Textiltvättens. and Instela.

"It is of great importance that we as a company contribute to the development of a more responsible and sustainable textile industry and mainstream its impact on the environment. This means that we need to look at all processes, from raw material use to extending the lifetime of garments, and finally have a sustainable end-of-life solution. Mistra Future Fashion enables us to take part of interesting projects within different phases of the product lifecycle, from manufacturing to user phase and recycling, with the focus on circular and sustainable systems. One of Mistra Future Fashion strengths is that many different actors, industry partners, companies and organizations, join and work together towards the same goal; to make the industry more sustainable. We all stand in front of the same challenge to turn the negative impact the textile industry have on the environment.

Re-Mix is one of the projects we are involved in. The project comprises a group of different companies from the textile industry, other industries and scientists, that are working together to find a solution of separating and recycling fiber blends. To create more circular systems as soon as possible, and dramatically minimize the raw material use within the industry, companies, organizations and research groups from different fields need to cooperate. The Re-Mix project gives us possibilities to be a part of the solution."

-Malin Wetterbrog
Material Development, Houdini Sportswear

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value to others

moving research forward

Enabling new knowledge to be leveraged and utilized is a key focus of the Mistra Future Fashion research program. It is called bringing ‘Value to Others’. It’s about making sure the research conducted within the program also gets implemented, whenever and wherever relevant. I.e. driving change towards more sustainable operations with the aid of new knowledge and results in hand leading to the systemic change. For example in the Circular Design Speed project a specific Value to Others workshop in June 2017 targeted a broader audience of designers, buyers and brands.

engaging in international networks

Engaging in international networks aims to enable further use of the Mistra Future Fashion results. In March 2017 Mistra Future Fashion was Affiliate Partner during the birth of the innovation hub ‘Fashion for Good’ in Amsterdam. In May 2017, Mistra Future Fashion became Affiliated Partner and the only research science partner to Ellen MacArthur Foundation’s textile initiative ‘Circular Fibres Initiative’, where several researchers contributed with data and knowledge input for the report “A textile Economy – Redesigning Fashion’s Future”. The engagement in the industry network Sustainable Apparel Coalition (SAC) continued in the set-up of the Higg Index and in its Transparency Group. The program also continued to support the European Cladding Action Plan (ECPA) with Program director Sigrid Barnekow and researcher Rebecca Earley at UAL as members of ECPA’s advisory group.

contributing with knowledge at national level

IVL Swedish Environmental Research Institute (IVL), the International Institute for Industrial Environmental Economics (IIIEE) and PlanMiljö have investigated policy options promoting fiber-to-fiber recycling of textile waste. In the fall of 2017 Maria Elander, IVL and Naoko Tojo, IIIEE met with the Ministry of Environmental and Swedish EPA to present the findings and results. In December, a half-day workshop was held at the Swedish Trade Federation presenting a deep-dive into the policy research and findings. The work will continue during 2018.

engaging sister projects

The more the merrier – enabling systemic change is not done by one actor in isolation or in one part of the textile and fashion industry ecosystem. It requires lots of efforts, by lots of people and organizations. Researchers engaged in Mistra Future Fashion are involved in several other research projects such as the Swedish strategic innovation project Bionovation and its “Närodlad textil” textile initiative, the EU Horizon recycling project Trash2Cash, the EU project NeuCell and the sorting project SPITex etc. In addition, Mistra Future Fashion supported other research on textiles. In conjunction to the Annual Program meeting in September in Stockholm the Nordic Council of Ministers was invited to arrange workshop with the consortium members and other stakeholders, under the lead of David Watson at PlanMiljö.

“Mistra Future Fashion was a key contributor to the report ‘A new textiles economy, redesigning fashion’s future’, launched by the Ellen MacArthur Foundation in November 2017. Mistra Future Fashion’s ability to bring together world leading researchers to build a credible evidence base that takes a systems view of the fashion industry makes them an important actor in the transition to a new textiles economy.”

- Francois Souchet
Lead, Ellen-MacArthur Circular Fibres Initiative

“Mistra Future Fashion is an excellent example of research at its best. We have come a long way in just a couple of years, and I think this is partly due to the fact that fashion companies and other stakeholders have been involved from the start, helping to define problems that need to be solved and willing to try out new business models.”

- Mauro Scalia
Manager of Sustainable Businesses, Euratex

“Sustainability is the new Quality. Quality and high added value is what makes European textiles different, and yet that’s no longer enough to compete. Sustainability joins quality as key factor of competitiveness. It drives investments and find its place at the center of the growth strategy of more and more of the 177.000 European textile and apparel companies. Better products and production processes come with a cost and, most importantly, need partnerships all along the value chain. We look forward to work with MFF to build up these partnerships and deliver all across the European industry.”

- Mauri Sisko
Manager of Sustainable Businesses, Euratex
event. Research seminar for journalists arranged by Swedish EPA Dr Sanda Ross from SwereaIVF presented “Killing myths and enabling fashion industry to become sustainable" and Di Ås fördubblades till RISE talked “Possibilities in future textile recycling” (Jan). Dr Kate Goldsworthy from UAL guest lecture at Beckman’s College of Design on Sustainable Design (Feb). Metro Future Fashion Program Director Sigrid Barnekow was a speaker about future consumers and transparency at the fashion conference MediaKransens Dag arranged by fashion industry magazine Habit in Borås (Apr). Barnekow participated at panel stakeholder discussion regarding Transparency arranged by Sustainable Apparel Coalition together with the Swedish School of Textiles in Borås together with Bruna Peters, from Honest By, Sofia Shop from SAC, Henrik Alpern from H&M, Professor Sandby Black from Center of Sustainable Fashion London, Sarah Ditty from Fashion Revolution (Apr). At breakfast seminar arrange by Kemi and Materialkull updated at Johannesbergs Science Park Dr Hanna de la Motte held a talk about “Recycling from a textile perspective” (Apr). In a round table event arranged by the Swedish government Barnekow spoke about the fashion industry challenges and need of shift towards circular economy system, including highlighting the pioneering work by Sweden to Swedish politicians and other fashion stakeholders (May). “How to extend lifetime of products and re-use” – table discussion by exemplifying with the textile and fashion sector led by Barnekow at World Circular Economy Forum related to the United Nation’s Ten Year Framework of Programmes on Sustainable Consumption and Production (OCTFF) in Helsinki (June). Barnekow moderated a stakeholders event arranged by charity organization Myrmot at Almedalen. In Visby on the topic of how to nudge consumer behavior with the panel members Ida Lemnese from Beatebetalldet, Susanne Sweet from Stockholm School of Economics/Metro Future Fashion and Emma Edqvist from Myrmot (July). During Almedalen in Visby Sigrid Barnekow participated in a panel dialogue on bio economy and sustainability by showcasing fashion industry, arranged by BioInnovation (July). During World Water Week in Stockholm Swedish Textile Water Initiative (SWIT) arranged the “Re:Use, Re:Make, Re:Think Fashion” showcase that presented sustainable Swedish fashion brands, under moderation of Sigrid Barnekow (Aug). In the Swedish fashion podcast “Hodepodden” Sigrid Barnekow discussed future sustainable fashion options together with designer Noam Jiooz and Jessica Johansson from Stockholm Fashion District (Sep). Dr Gustaf Sandin Albertsson from RISE attended the research project Trash2Cash podcast and talked about conducted review of the environmental impacts of textile reuse and recycling (Oct). Barnekow participated in two panel discussions around sustainable fashion during the media day FARey with Dawanas veltid och Mama Magazine (Oct). Barnekow participated in Design-BAR’s panel hosted by Swedish Institute in Paris discussing about the textiles of tomorrow together with Måikel Lindstrom from RISE and Christine Brousseau from T3Miel (Nov). Barnekow participated in a panel debate together with Ida Lemnese from Beatebetalldet, Aleksandar Davidsson from Medelhavens Konsument, Cornelia Sun and Vanessa Rothschild from H&M arranged by 10YES in Stockholm (Nov). Metro Future Fashion experts Dr Hanna de la Motte from RISE, Associate professor Susanne Sweet from SSE, Dr Kate Goldsworthy from UAL and Sigrid Barnekow contributed with input to the Ellen MacArthur Foundation report “A new textiles economy: redesigning fashion’s future” (Nov).

Metro Future Fashion events • Launch event May 4th for the Circular Design Speed project together with Filippa K, at Alma in Stockholm. The project is led by Professor Rebecca Earley & Dr. Kate Goldsworthy from University of the Arts London. The 2 year project includes researching, developing and testing of new strategic design for 100% circular fashion garments. At the launch the speaker list consisted of Becky Early and Kate Goldsworthy from UAL, Erik Larson, Sustainability Director at Filippa K, and Program Director Sigrid Barnekow. The event was open to special invited guest and stakeholders, as well as press. During Almedalen Metro Future Fashion arranged a collaboration event with Svensk Handelsföreningen speaking about the new report on mandatory EPR that included full lifecycle aspects, including upstream improvements. Discussion regarding “How can Swedish become best at ending the textile cycle?” (July)

Annual Program Meeting Sep 27-28, Stockholm. Around 90 guests, researchers partners and industry partners from all different parts of the value chain, producers, designers, fashion brands, charity/reuse, recycling, forest industry and policy makers, were gathered for Metro Future Fashion’s Annual program meeting. In 10 years into the program it was an extensive review of results coming out from the program. Day 1 was dedicated to review of results, new knowledge and innovations, all with purpose to contribute to the program vision, to enable a systemic change of the fashion industry and society. Day 2 was dedicated to workshops for specific research tasks, “Climate for Sustainability – Practical use of the concept of Sustainability”, by Sanda Ross at Swerea IVF and Gustaf Sandin Albertsson, RISE “Making use of LCA data”, by Sanda Ross at Swerea “Is in-built recyclability a future track of sustainable cotton coloring?” by Hanna de la Motte at RISE and Romain Bordes at Chalmers “Driving more sustainable consumption” by Claudia Rodemaker at Stockholm University and Wenche Gwiazd at Copenhagen Business School.

dissemination examples
A broad mix of activities was conducted throughout the year targeting consumers, politicians and industry.
contributions 2017

doctoral theses


academic publications


keynotes & industry presentations


events, workshops, lectures


Naoko T. Workshop with the industry representatives (T4RI-meeting) where the report mentioned above was presented and discussed. Gothenburg. December 6th.

Roos S. Presentation at the Textildialogen about LCA and Mistra Future Fashion. October 12th.

Roos S. Presentation to the Swedish Minister of Environment about Mistra Future Fashion at Swedens UV. December 11th.

Sweet S. Cradelnet Seminar, Panel debate. October 25th.

conference contributions


conference contributions


conference contributions


**selection of media exposure 2017**

**January**
- Aktuell Handelsbladet, Modetrends: Måste bli bättre på att veta att hållbara varor

**February**
- Aktuell Handelsbladet, Tid varika tips som minskar din klädtvarkylare när du köper kläder
- SVT, Fokus: Dags att ta ansvar för planeten via kläder
- Recycling.net.se, Sitra ut kläder bättre för miljön

**March**
- Ecotextile, Textil och Mistra partner en recycling research
- Recycling International.com, Experts under for sustainable clothing initiative
- SR, Shoppingresor orsakar stor miljöpåverkan
- SR, Kundens transport en femtedel av miljöpåverkan

**April**
- Ridd & Rön, 50 påverkar dina kläder miljön
- Habit Mode, Vågen till konsumentens hjärta

**May**
- Business Green, Ellen MacArthur teams up with world giants to launch Circular Fibres Initiative
- Elle.se, Din idag är ultiqgt när modeblogger skriver om från linje till circuits
- Ecotextile, Filippa K to undertake circular fashion pilot
- Resource, EFH launches circular fibres initiative to map a sustainable future for textiles

**June**
- FORSKNING, Tre sätt att minska mikroplastutsläpp från polyestertyger
- TEK, Ny rapport om mikroplasten från Mistra Future Fashion
- Ecotextile, rapport kross om textilåtervinning
- Habit Mode, Rapport kross om polyestertyger

**July**
- DN, Klimatmartera att driva längre på klädesplaggen än at återvinna dem
- SR, Inte bara företag som är plasticbov bland klädesplaggen
- Habit Mode, 50 minimeras mikrofibers

**August**
- Elle, Upplösning de klor
- Mjölk-utveckling, Ny metod kan revolutionera textilåtervinning
- Forskning, Garmen lurnall blir nytta tyger

**September**
- Göteborgs-Posten, Här finns moderna material
- Habit Mode, Seminarium om textil lockar fullt hus

**October**
- SR, Veranda’s World, Jakten på den miljövänliga hållbara textilväsen
- Dagens ETC, Handelsbladet på mödet efter MBN-åknen
- Habit Mode, Verktyg för cirulár produktion

**November**
- Ecotextile.com, Recycling ‘breakthrough’ on poly/cotton textiles
- Sourcing Journal, Sweden’s Blend Re:wind has a new process for recycling cotton and polyester
- Fashionforum.dk, Nu bliver det nemmere at slita ut klæder

**December**
- Sourcing Journal, Top Textile Innovations of 2017, From Tencel to Polymer and Beyond
- Recycling & Miljöteknik, Process är혁신의 바탕 för textilåtervinning
- Habit, Genombrutt: My process for återvinnning av textil

**Selection of Media Exposure 2017**

**Management**
- Sigrid Barnekow, Program Director
- Dr. Anna Kamppi, Deputy Program Director
- Assoc. Professor Susanne Sweet, Research Manager
- Malin Viola Winberg, Communications Manager

**Theme Leaders**
- Dr. Kate Goldsworthy, Theme Leader 1 – Design
- Dr. Sandra Ross, Theme Leader 2 – Supply
- Assoc. Professor Claudia Radermaker, Theme Leader 3 – Users
- Dr. Hanna de la Motte, Theme Leader 4 – Recycling

**Board**
- Nick Morley, Chairman, Fashion Ltd
- Margaret Sivnanan, McNamee
- Anna-Karin Jönbrink, RISE
- Ass. Professor Claudia Radermaker, Theme Leader 3 – Users

**Co-opted, Contact at Mistra**
- Mathilda Thom, University of Göteborg, University of London
- Philip Workander, Lund University
- Kent Wiberg, RISE
- Elin Frendberg, Swedish Fashion Council

**Annual Report 2017**
- Mistra Future Fashion
### Updated Program costs 2016, Phase 2

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<th>Program</th>
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<th>Total Mistra kSEK</th>
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<td>6740</td>
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<td>2218</td>
<td>1536</td>
<td>54</td>
<td></td>
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<tr>
<td>Recycling Theme</td>
<td>6950</td>
<td>732</td>
<td>7682</td>
<td>2792</td>
<td>2954</td>
<td>72</td>
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<tr>
<td>Program Board, Management, Communication</td>
<td>9300</td>
<td>0</td>
<td>9300</td>
<td>2582</td>
<td>2919</td>
<td>72</td>
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<tr>
<td>Remaining in Strategic Reserve fund</td>
<td>2408</td>
<td>-</td>
<td>2408</td>
<td>-</td>
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<tr>
<td>Total</td>
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<td>1592</td>
<td>40000</td>
<td>11024</td>
<td>9541</td>
<td>57</td>
<td>5536 (2017*)</td>
</tr>
</tbody>
</table>

*) Only reported until June 2017
The current system for fashion is broken. Given the environmental impact and challenges linked to production and usage, a new model is required.

Mistra Future Fashion is a research program that focuses on how to turn today’s fashion industry and consumer habits toward sustainable fashion and behavior. Guided by the principles of the circular economy model, the program operates cross-disciplinary and involves 60+ partners from the fashion ecosystem. Its unique system perspective combines new methods for design, production, use and recycling with relevant aspects such as new business models, policies, consumer science, life-cycle-assessments, system analysis, chemistry, engineering etc.

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