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The Textile Toolbox

New Design Thinking,
Materials & Processes
for Sustainable
Fashion Textiles

Project Report
(2011–2015)

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executive summary

This report reviews the design research conducted between June 2011 and May 2015 by a team of University of the Arts London (UAL) textile researchers, led by Professor Rebecca Earley, who are part of the Swedish funded multi-disciplinary Mistra Future Fashion (MFF) consortium. The objective of the consortium is to research opportunities to advance a more sustainable and competitive fashion industry.

Whilst the environmental impacts of commercial production and consumption have increasingly been the subject of debate in recent years, textile and fashion designers have been considering their responsibilities as creators of sustainable products and systems and have been struggling to find a way to fully comprehend the challenges and to know how to go about tackling them. This team wanted to propose design as the agent for change – working right at the heart of the problem. Basing themselves in organisations and companies of all scales, the research team worked on a process of progressive problem solving with others to propose a new course of action to help their community improve its work practices.

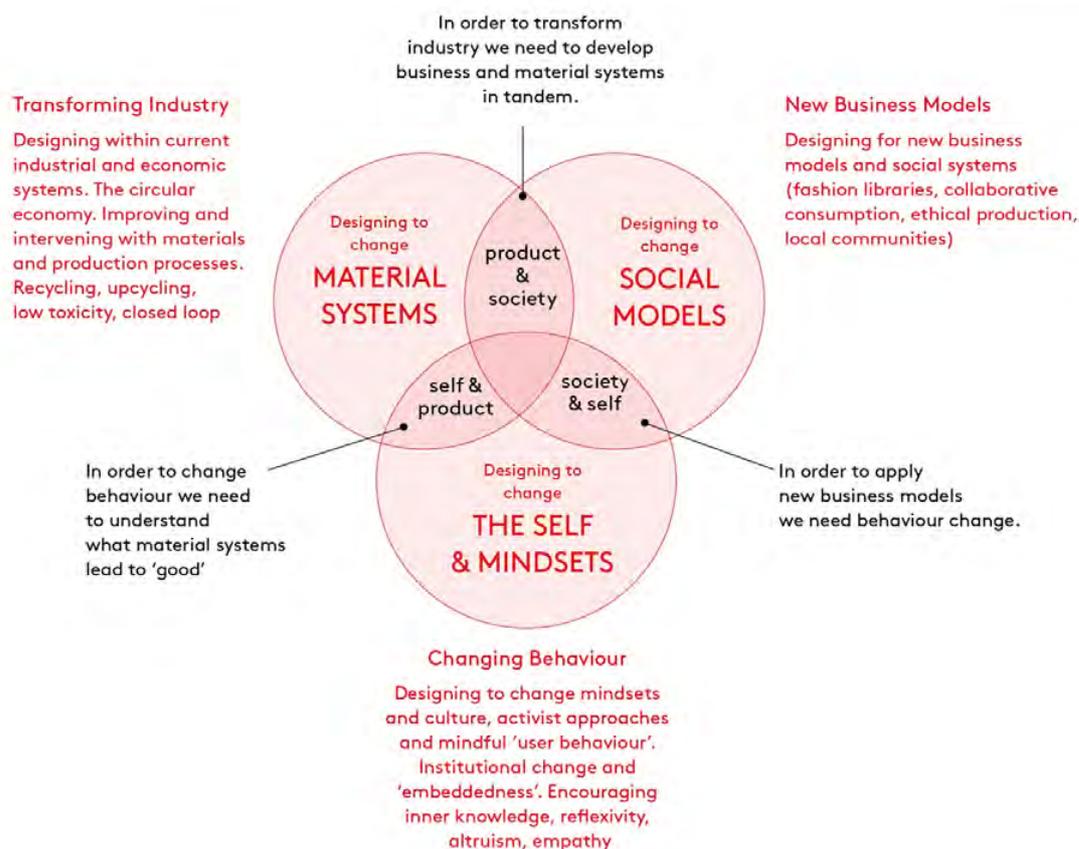


Figure 1: Materials, Models and Mindsets (Earley, Goldsworthy & Vuletich, 2015)

The researchers identified three interconnected themes for the project: material, product and process innovation; social, systemic and economic concepts; and, the self and shifting mindsets and habits. We present these here as Designing to Change

Material Systems, Social Models and The Self and Mindsets (figure 1). We propose that this new framing of the field will enable thinking around sustainable fashion to potentially broaden its scope and impact by developing more design-driven initiatives in collaboration with expertise such as new business models, consumer behaviour, psychologists and anthropologists.

PLAN	ACT	OBSERVE	REFLECT
Identifying Informing Organising	Trialling Collecting Questioning	Analysing Reporting Sharing	Evaluating Implementing Revisiting
STAGE 1: Identifying the Questions with Stakeholders	STAGE 2: Developing and Delivering the Workshops	STAGE 3: Curating, Designing, Making, Exhibiting	STAGE 4: Evaluating, Revisiting & Communicating
New Design Decisions	New Design Models (a)	New Design Models (b)	New Design Tools

Table 1: Project 3 action research framework and stages

The four stages of the project (table 1) show an adapted action research framework. The project team first produced a landscape review using the framework of TED’s The TEN (Earley & Politowicz 2010), identifying the characteristics of existing approaches and the potential for new thinking therein. Further case study research, informed by discussions at H&M and the Sustainable Fashion Academy (SFA) in Stockholm, enabled the team to design and build a toolbox for delivering professional training programmes and educational experiences to designers and teams in companies of all scales. The project team considered working with emerging designers – Masters students – to be an essential part of the project, and the creative outcomes of the teaching projects are included in this report.

Workshops asked participants to reflect on and evaluate existing fashion products and to propose ideas to improve them. Tactility was a key approach and existing garments were used in workshops with brands. The development and testing of new hands-on tools at H&M led to an improvement in daily decision-making around sustainable design of up to 7%. Product redesign scores, created using the Higg Index, varied from 1% to 41% improvement, with all the highest percentage improvements occurring in the second version of the workshop in November 2014.

With this new insight the TED researchers explored new design models through internal workshops and hands-on practice. They curated an online and touring exhibition with new prototypes that demonstrated how designing fashion and textile prototypes could enable us to better understand the industry and cultural potential for systemic change. The resulting 10 prototypes demonstrate new ways to ‘play’ the TEN strategy cards: to select ‘lead cards’ and then layer the thinking beyond the most immediate design decisions.

Integral to the project were the ideas developed by the project’s PhD researcher, Clara Vuletich, whose investigation sought to explore new roles for fashion textile designers in industry contexts and to understand the importance of individual values and the self

in her *Transitional Textiles: Design for Social Equity* work. She produced new insights around design strategy, models and tools for transformation through workshop facilitation and consultancy approaches; engaging with industry stakeholders to enhance the teams' skillset and capacity for ideas getting used and embedded within the stakeholder group. This led to the 'I' shaped designer, extending the Brown (2006) model from a 'T' into a reflective, extended shape for 21st Century practice (figure 2).

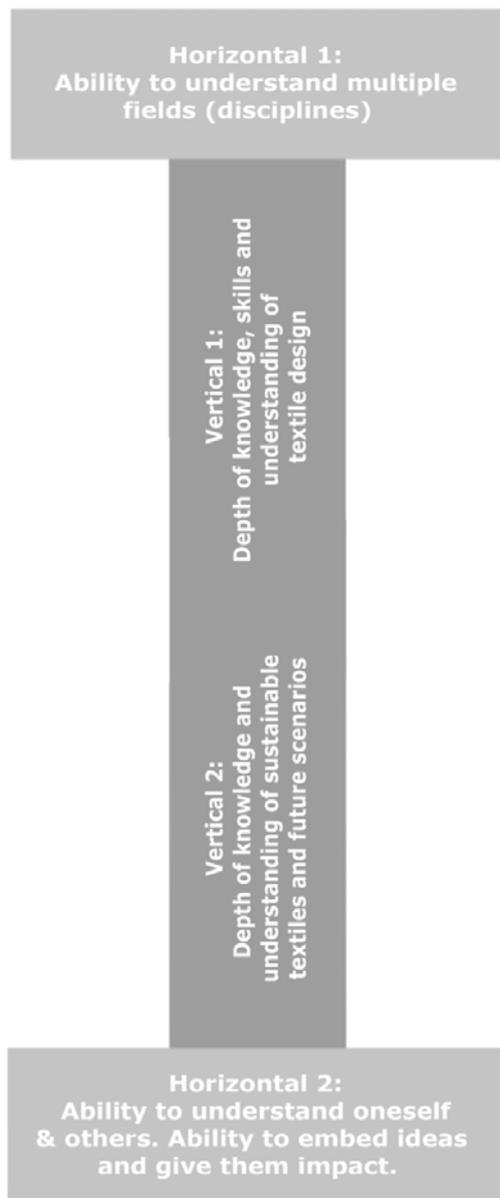


Figure 2: The new 'T' for textile design is an 'I' – extending the shape by building in sustainability expertise and deeper knowledge of oneself and others

In stage 4 of the project the team updated textiltoolbox.com website and shared the design tools that had been developed and tested throughout the project. 61 redesign concepts are included on the site, demonstrating the sustainability improvement in

design achieved through using the workshops tools. This qualitative design toolbox emphasises the understanding of lifecycle thinking in the design of fashion and textiles, and offers practical ideas in how to apply this understanding. Data collected from the stakeholders and the website enabled the team to understand the ideas that had most impact and where more research is needed. The report concludes with our recommendations for future research for specific stakeholder groups using our new framework for action – Society, Product & Self.

Phase 2 MFF research began in June 2015, and the team is currently acting on the recommendations, focusing on using practice and action research to produce guidelines for Designing for the Circular Economy and appropriate material and product speeds.

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Director of the Textile Futures Research Centre (TFRC)

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table of contents

1. background & context	7
1.1. the role of designers.....	7
1.2. TED research group & the TEN strategies	11
1.3. the TEN and MISTRA	12
2. what was the research?	15
2.1. aims and objectives	18
2.2. audience	18
2.3. research questions.....	19
2.4. the transitory textile designer	20
2.4.1. introduction	20
2.4.2. the project	21
2.4.3. aims and objectives	23
2.4.4. audience.....	23
2.4.5. PhD project timeline	23
2.5. research project tasks & deliverables	24
2.5.1. plan: identifying the research questions	25
2.5.2. act: delivering the workshops.....	26
2.5.3. observe: curating, designing, making, & exhibiting	27
2.5.4. reflect: evaluating, revisiting & communicating.....	29
2.6. key performance indicators.....	30
2.7. project timeline.....	32
3. how did we conduct the research?	35
3.1. iterative design research methods introduction.....	35
3.1.1. practice-based research.....	35
1.1.1. action research	36
3.1.2. process: methods framework	37
3.2. PLAN: identifying questions and landscaping.....	40
3.2.1. context review of the TEN	40
3.2.2. industry case study review	41
3.2.3. the web platform as research method	41
3.3. ACT: addressing questions through action workshops with stakeholders ...	42
3.3.1. facilitation of design innovation process.....	43
3.3.2. researcher as design facilitator	44
3.3.3. reflective questionnaire.....	45
3.3.4. dialogue	45
3.3.5. participant questionnaire	46
3.3.6. analysis of re/design concepts	46
3.4. OBSERVE: curating, designing, making, exhibiting	47
3.4.1. exhibition curation	47

3.4.2.	textile/fashion prototypes	47
3.4.3.	audience survey	48
3.5.	REFLECT: sharing through writing, collaborating and utilising digital tools	
introduction		49
3.5.1.	academic writing in textile research.....	49
3.5.2.	collaborating and utilising digital tools.....	49
4.	what did the research reveal?.....	50
4.1.	new design decisions	53
4.1.1.	sustainable textile design now	53
4.1.2.	Design Education: Sustainability Knowledge and Mindsets	58
4.1.3.	design decision making in fashion companies.....	65
4.2.	New Design Models	79
4.2.1.	introduction to the redesign concepts	79
4.2.2.	new design concepts (practice-based research)	92
4.2.2.3	mindsets & the self: designing for attitude change.....	104
Mindsets & the Self: Designing for Attitude Change.....		112
4.3.	new design tools.....	114
4.3.1.	overview of design toolkits.....	114
4.3.2.	card games as design tools for sustainability.....	115
4.3.3.	TED's tools for redesigning products.....	116
4.3.4.	key insights on using the tools.....	123
4.4.	PhD research project results	132
4.4.1.	new design decisions	132
4.4.2.	new design models	132
4.4.3.	new design tools	135
5.	summary of findings	139
5.1.	summary - new design decisions	139
5.2.	summary - new design models (a)	141
5.3.	summary - new design models (b)	142
5.4.	summary - new design tools	144
6.	implications for future research.....	148
appendices.....		154
appendix 1 – case studies.....		156
appendix 2 – tables & figures.....		186
appendix 3 – project bibliography		190
appendix 4 – project logistics		196

1 background & context

1.1 the role of designers

The environmental impacts of commercial production and consumption are increasingly the subject of debate. Textile and fashion designers are considering both their responsibilities and their potential to generate innovative, sustainable products and systems. Designers, therefore, became the key stakeholder group for our research: in large corporations; in independent small and medium sized enterprises (SMEs); and in the higher education system.

Designers are strategic agents for change, able to directly generate imaginative solutions for policy makers, consumers, media and business leaders. This is not a top-down process of innovation, which cannot come entirely from the influence of consumers or media sources. We believe that designers of fashion and textiles should seek a strategic role in industry and, therefore, society, to make positive change within a set of core values, by providing insights that could be adapted in other spheres of enterprise.

Designers, working within all stages of the fashion supply chain from the design of fibres to digital retail environments, need a comprehensive map of the potential opportunities for positive change and the design tools to succeed. When sustainability is considered designers, collaborating in cross-discipline teams, add value to form and function. In so doing they can instigate opportunities for commercial fashion companies to transform rhetoric into action, by embedding sustainable processes and products into the fashion system.

Academics such as Kate Fletcher present us with a 'call to arms' for a contemporary design philosophy, from which textile designers have the potential to demonstrate their burning ambition to make textiles more sustainable by including life-cycle thinking in their design strategies. In particular, they are rising to the challenge of making environmental improvements key to design innovation, 'to trial and develop innovative technologies and approaches that reduce resource use, and uses the catalytic potential of design to bring change' (Fletcher, 2008).

Over the last twenty years, the rise of eco priorities in all kinds of product development has put a spotlight on materials. Everyone is aware of the mantra 'reduce, reuse, recycle', which puts the focus clearly on a concern to be economical with materials, find systems to capture waste streams and to cut out as many harmful chemical treatments as possible at all stages of the textile lifecycle. More is now being understood about the significance of the 'user phase' of the lifecycle (for example the consumer's contribution to environmental damage through the use of water and energy in laundering garments) as well as the opportunities to design for upcycling and forward recycling of products when 'in retirement', at the end of a (sometimes short) working life. Design for reconstruction is an important strategy within the

canon of a designer working on products for any market: 'Recover, reconstruct and rekindle should be the keywords for a new, more environmentally conscious economic recovery.' (Design Council, 2011). Design businesses, seizing combined 'business and environmental benefit', are seeking to make pre- and post- consumer waste the raw material for design development. Over one million tonnes of textiles are thrown away every year in the UK alone (WRAP, 2012). The obvious economic and environmental advantage of using an otherwise 'worthless' source of material is complicated by the investment and ingenuity needed to prepare and transport it for creative re-processing.

The emphasis is shifting currently, as designers seize the proactive position to add services to products and to displace consumption with designed experiences. In this regard, the ideas are coming from other manufacturing models such as leasing from automobile and communications industries and distributed manufacture from the engineering industries. Small start-up businesses who can propose flexible, collaborative, networked organisation can offer original, often locally produced, products and services. There can be a requirement to cross design discipline boundaries in the development of products. Scaling-up to sizeable manufacture or setting up collaborative networks on a global scale is the next big hurdle in the rise of such models. Car manufacturer Riversimple designed a new hydrogen fueled car, where the design is 'open source' and leased rather than sold. This has moved Riversimple from manufacturing into service provision: "We retain ownership of the cars and sell mobility as a service." (riversimple.com). The equivalent within the fashion industry would be to give away the design, which is already easily copied, and to seek a revenue stream from an associated service.

What would be the effect of shifting garment production from China to the UK? What would happen if consumers kept their clothes for longer and washed them less frequently and at lower temperatures? The reason to ask such broad questions is because awareness of various unwanted environmental and social consequences of clothing/textile production is growing, but there is little agreement on what should be done... The scenarios have been grouped into four key themes representing the key themes that might occur in the operation of the sector: changes in the structure of the supply chain; changes in the design of clothing and textile products and the materials used; changes in the behaviour of consumers; changes in the influence exerted on the sector by the government. (Allwood et al, 2006)

To address the issues raised by Allwood et al, it is useful to identify what current evidence there is of change in the form of practical responses to four key scenarios, which need to be overlapping in their effects: changes in the supply chain; changes in the design of clothing, textile products and materials used; changes in consumer behaviour; changes in the influence exerted on the sector by the government.

Evidenced through their Corporate Social Responsibility (CSR) statements, manufacturers' have concentrated their efforts to improve supply chains on the ethical standards of materials procurement and conditions of employment, in a sustainable responsible approach to business. The United Nations has produced guidelines for investors in 'Principles for Responsible Investment'. It is widely accepted that CSR

adheres to similar principles but with no formal act of legislation, relying instead on self-regulation and incorporating the public interest into decision making.

We are seeing some mainstream brands embrace more sustainable options such as organic or fair trade products – and reap the benefits. Better traceability of the supply chain will allow responsible retailers to procure more ethically and will allow customers to make more informed choices. (Draper et al, 2007).

As described in *The Long Tail* (2009), Chris Anderson originally observed distributed networks or 'long tailed distribution' of downloads in the music industry. He then observed the same phenomenon in the 'niche' groceries in his local whole food store: "Our growing affluence has allowed us to shift from being bargain shoppers buying branded (or even unbranded) commodities to becoming mini connoisseurs, flexing our taste with a thousand little indulgences that set us apart from others... its an easy leap to see it at work more broadly, from cars to crafts." (Anderson, 2009).

Design consultancies such as Pentagram or Imagination have historically been models for media, product and architecture collaborations, offering corporate identity, branding and product design to international clients. Today, there is a need for new collaborative consultancies to work with fashion, media and product design to integrate systemic, sustainable practice in the fashion industry. Certainly, there is evidence of new young businesses seeking the huge structural advantage of having a networked collaborative manufacture. The development of new models of production have shifted the focus of design and manufacture progressively towards distributed and consumer-centred control.

Distributed (cloud) manufacture heralds a new era in the history of automated production. The integration of information about the user into computer design and production systems has revolutionised manufacture within and across businesses. 'Agent-based' enterprises, rather than 'top-down' structures, offer flexible and non-hierarchical systems catering for self-interest, niche markets and diversity of demand in a wide range of geographical locations.

With the evolution of the information and communication technologies and standards, adoption of the internet, growing instability of the business arena, and increased competition, manufacturing systems boundaries are extended from a factory towards various types of network relationships. As consequence, enterprises' mission and business strategy have also changed, e.g., from product competitive advantage towards collaborative added value, and the way enterprises perform business have been transformed (e.g., migrating from traditional practices to e-business, and the information related to manufacturing processes is transmitted over the Internet). (Chituc and Restivo, 2009).

Networked consumption 'Open Source' models rely on mass participation in the creation of the product. Examples originate from the computing industry, including Linux and the knowledge network Wikipedia. Grameen 'barefoot banking' in Bangladesh and 'opencola', where the recipe is on the can, demonstrate the application of open models to a wide range of industries. The boundary is blurred

between the users and producers, making it difficult to differentiate between those who are doing the creating and those who are the consumers. In 2010, the online company Etsy was valued at \$300million. Rosy Greenlees, in the UK Crafts Council Report 'Consuming Craft', states that "the craft sector increased its market share through the [recent] recession with consumers increasingly choosing authentic handmade or individual items" and that the total market for original contemporary craft is currently between £913m and £1.87 billion. Charitable organisations, such as Desis, are dedicated to developing toolkits to show students how to become social innovators, while online platforms such as the TEDx groups encourage models of good practice to be shared across continents in a 'multi local' concept.

The inclusion of the consumer in design and production, especially with user access of 3-D printing, has begun to interest businesses while democratising the tools of manufacturing. The Web 2.0 revolution is changing perceptions and influencing a younger generation. Tapscott (2008) states that for the youth culture growing up within this media age (Generation Y), technology is transparent, it's like the air; they don't talk about the technology but define it through use and experimentation. The individual consumers/users "do not innovate or develop everything on their own (but) benefit from user innovation communities". (Shirky, 2006)

All this user-centred production and involvement could be directed towards the polluting 'use phase' of the garment, as Fletcher observed in 2008: "The message here is stark: the biggest gains in environmental performance for many textiles and fashion pieces can be made by tackling the impact made by washing and drying... a vastly under-explored idea of innovation in sustainable fashion and textiles."

'Ownership' of design strategies to reduce damaging laundry habits is made possible through user involvement. Designers and/or users can affect aesthetic preferences in appearance with ecological advantages, such as garments with a crumpled look, a worn, mended and unfeasibly shrunk or oversized silhouette, promoting a greener approach to laundry. The overwhelming acceptance of vintage looks, coming from street fashion as much as designer-led initiatives, is almost a contemporary obsession. This identifies the need for garments to be well-made and resilient in order to withstand multiple owners.

Changes to the materials used in designing clothing and textile products, evident in production processes for every category of fibre including the spectacular early developments in growing 'vegetable leather' from green tea cultures, are described by Suzanne Lee (a 2011 TED Fellow, USA). A new silk film, achieved by reverse-engineering the self-assembling protein into a versatile biodegradable material, has been achieved by Prof. Fiorenzo Omenetto and his team in Tufts University, USA. The new Eco-Circle Plant Fibre, to be launched in 2012 by Teijin Ltd., is a 30% plant-based PET to be used within the Eco-Circle closed loop recycling system. Fibres and filaments for technical and industrial use are also appropriated for fashion as the potential for greater integration between science and social needs is realised. Since the first electro-conductive fibre was commercialised in 1998, technical developments into smart fabrics have provided new solutions for cooling, energy harvesting, sensing, communicating, measuring and monitoring, revolutionising fabrics for sports, health and wellbeing.

Classic fabrics, produced in conventional ways, are still appreciated for their tactile and decorative qualities. Material, suitable for finely worked heritage garments, often demonstrates craft skills, inspires designers to conceive of a 'long-life' potential for fashion. Craft traditions allied to contemporary mechanised production systems provide top quality fibres, fabrics and garments. The value to society of such production is well documented by contemporary anthropologists. In his theories of consumption, Baudrillard (1981) describes the meanings invested in the objects of everyday life. He quotes Roland Barthes in saying that objects always "say something about their users."

The task for fashion and textile designers now, is to employ fashion textiles to transform user behaviour.

1.2 TED research group & the TEN strategies

"...it is estimated that decisions made in design are responsible for eighty to ninety percent of a product's environmental and economic costs." (Graedel et. al., 1995)

Prior to 2007, few proven methodologies existed for designers to be proactive towards sustainability. New design prototypes were needed to provide compelling models for business, media and consumers. Clear strategies needed to be identified, researched, tested and made available. In both textile design and in fashion there were few methodological descriptions of practice in research literature and almost none of sustainable textile design practice.

Following the completion of the Worn Again AHRC project (Earley, 2005-2009), the TED research team developed and tested design strategies in academic practice, but had little opportunity for testing in large-scale commercial contexts. TED research had a vision of an expanded supply chain, in which the consumer is considered as an active participant and a valuable resource towards sustainable fashion. (Earley & Fletcher 2003; Bowles, Page, and Round, in Earley 2007).

TED researchers wanted to construct a framework for both philosophical development and practical action. The resulting TEN strategies were developed, tested and revised from 2007 to 2010 in a series of professional and academic contexts. Through interactive workshops students could freely explore the implications for critical reflection and social change implicit in the strategies.

TED presentations and interactive workshops were also conducted with a range of companies from large international businesses including PPR Home and the Gucci Group, to SMEs participating in events at Future Factory, Nottingham Trent University (NTU) and the Sustainable Fashion Academy, Stockholm (SFA). The TEN evolved into a comprehensive framework - developed by designers to translate theories of sustainability into practical action - and proved to be a powerful tool for innovation in large and small fashion and textile businesses.

In 2010, VF Corporation¹ commissioned TED design researchers, as a university-based team, to propose innovations in individual strategies from our sustainable design tool, TED's The TEN. Each selected strategy led to a proposed innovation concept in material, product and systems-design, relevant to a range of VF global brands. Each concept was devised collectively by the team, in consultation with the client, and then created by individual design researchers. The team refined the proposals before presenting to the client for final feedback within an agreed 'now, near and far' timeframe. The resulting prototypes, offering fresh thinking for 'bespoke' improvements to products relevant to the brands, were presented at a global summit in USA in 2012.

1.3 the TEN and MISTRA

The TED team was aware of the potential benefits of combining the TEN strategies in a variety of ways and sought an opportunity to test their ability to produce new propositions for material and product improvement in fashion. In stages 1 and 2 of the project period the research team and external collaborators used 'The TEN' strategy cards (Earley & Politowicz, 2010) to review current design decisions and best practice in fashion in Sweden and globally. Kay Politowicz revised the existing TEN texts to create a more design-focused language to help with the generation of new ideas (see Fig 5, p.18-19).

The question posed in the Mistra call document (MISTRA, 2010) coincided perfectly with TED's publishing of The TEN. The consortium structure presented an opportunity for critical discourse to encourage communication, share expertise, and enable multidisciplinary teams to work together, not only as a rational, problem-solving activity, but also as a means of making imaginative leaps towards systemic change. Designers can best propose interventions for sustainability when they are able to collaborate with the range of disciplines present in the MISTRA Consortium. Furthermore, MISTRA has enabled the research team to collaborate with a large Swedish clothing brand (H&M), to develop existing relationships with SME brands (through SFA) and to introduce a model for a short-course programme for educational institutions.

Working for global business with H&M design teams, TED researchers introduced inspirational prompts for combining new factual information with existing knowledge of production processes to enable designers to recognise and evaluate ideas for quick and economic improvements relevant to the company. Resulting new prototype ideas, combining the TEN strategies, provide practical interpretation of H&M's 'Seven Conscious Commitments'.

The effectiveness of The TEN cards for SMEs has also been developed from engagement with Swedish design teams in group discussion, game-play and role-play workshops. The introduction of The TEN as a flexible, theoretical tool enables professional

¹ VF Corporation is a large USA-based apparel and footwear company founded in 1899, which owns 30 brands including North Face, Vans, Eastpak, Wrangler, and Timberland.

designers to map sustainable design opportunities. It also provides a provocative structure for the radical redesign of products, promoting innovation, particularly when the ideas are interconnected. The Higg Index is used to facilitate evaluation of the improved product profile as part of an interactive exercise.

Emerging designers in Sweden (Konstfack Stockholm) and UK (UAL London) undertook experimental and practical explorations. Their projects have taken advantage of an open and culturally diverse academic environment to challenge norms and collaborate across disciplines. A focus on sustainability has introduced philosophical interest and political depth into designing textiles and fashion, requiring reflection on the nature of production, its meaning and questioning the very need for a product.

The process of design thinking generates new insights and creative proposals, which address sustainability in textiles and fashion production, use, and disposal, and extends this ambition to the very mindset of the designers themselves. Our research aims to bring technology, life-cycle thinking and service design together with reflective tools to propose a transformed system. We create 'enabling prototypes' to embody our thinking, which may act as narrative props in some cases and socially responsive proposals in others. We are always mindful of a range of consumer aspirations, preferences and desires. The aesthetic and practical value of our proposals, in response to consumer preferences and with regard to their performance, is of paramount importance. A human-centred approach engages consumers and users. In combination with the technological focus of MISTRA scientific colleagues, P3 aims to challenge the ill-defined problem of sustainability, by 'reframing' the question from a reflective design perspective.

TED research brings tacit and embodied knowledge of material qualities and human behaviour, focused by The TEN strategies, to produce design developments that can be embedded in the fashion system.

The benefit to material and product development comes from establishing why objects are meaningful for people and why they matter. In the MISTRA consortium, understandings are confirmed and misconceptions are diagnosed, in a knowledge structure that also promotes a rigorous culture of enquiry (figure 3).

For example, the inter-relationship with designers (P3) and fibre scientists (P4) has enabled fashion-led preferences to be considered from the outset in developing fabric qualities aligned with consumer requirements. Investigations into potential ways to exploit user interaction and service design in fashion (P3) with the benefit of research into new business models (P1) has offered designers real-world contexts as guidance.

The mutual benefit of project collaboration has been highlighted in the way that design developments in the automotive industries and architecture (studied in P3) have pointed to ways of rethinking existing systems for procurement and maintenance of public fashion such as hospital gowns (P6). The information exchange between recycling (P5) and LCA experts (P2) is proving to be a compelling analytical device for establishing typologies and seeking design outcomes with 'forward cycle' benefits.

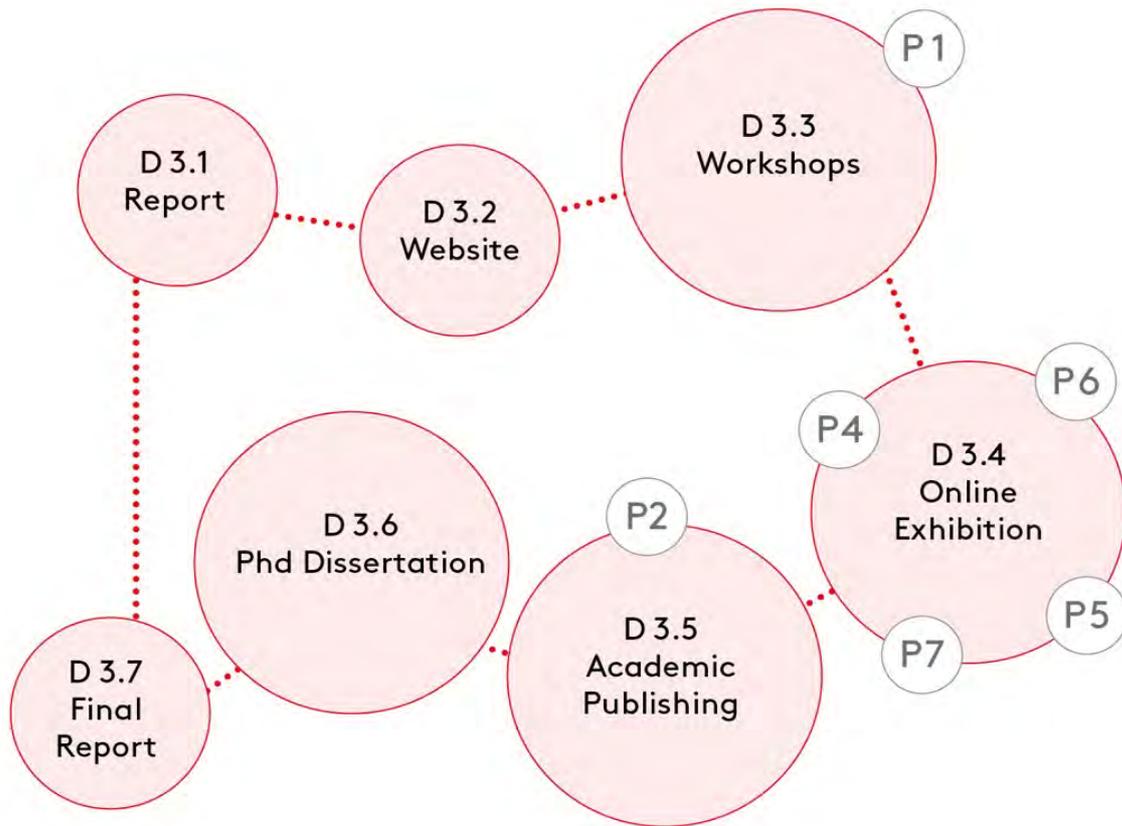


Figure 3: Visualisation of the P3 deliverables and the interactions with other projects

The use of design prototypes in working with all groups is a necessary addition to argument and statistics in promoting a transformation of existing systems. The 'making skills' critical to textile and fashion designers encourages a culture in which the artifacts that emerge are experienced simultaneously as objects and as propositions. This is valuable in our contact with consumers (P7 methodologies), from whom designers have traditionally been separated until products are fully commercial propositions. Here the engagement of consumers and an evaluation of their reaction to prototypes in development facilitate new possibilities for the designers (P3) to structure their working processes.

2 what was the research?

The MISTRA funding call asked 'How can sustainable design processes be created and embedded within companies and gain the participation of consumers?' Our response was an action research project proposal that would situate us at the heart of the designer's workplace.

In our original project proposal, we recognised that the overwhelming opportunity for sustainability in the fashion industries is that of innovation in connected thinking at all stages of the 'cradle to cradle' environment.

At that point in time (November 2010) sustainable textile designers tended to deal with isolated problems in a piecemeal way. A designer would often choose to upcycle, use natural dyes, or source organic cotton, and this becomes their 'thing'. Around this their aesthetic develops, and the designer considers that this is their chosen path to more sustainable fashion and textile design. By the end of 2010 several fashion brands were becoming known for this approach, but the TED researchers wanted to support and accelerate a more holistic approach to sustainable design – a multifaceted approach that could lead to greater innovation, environmental improvement and also market advantage.

From prior experience of working with other companies the team at TED believed that textile and fashion designers needed to be trained to think and create within a full framework of sustainable design concepts, and be able to combine complex technical techniques together with new materials and processes, along with product design ideas that improve the use and disposal potential of the product. There was also a distinct lack of good quality, reflective writing in the field of practice-based sustainable textile and fashion design, and a need for innovative and clear methodologies to be tested, applied and published. To embed these design strategies into companies, sophisticated professional training programmes were needed: ones which are both highly creative, encouraging new connected thinking that leads to sustainable design innovations, and which enable the company to evaluate the design thinking, finding ways to make use of the innovative ideas quickly and economically.

This project proposed to develop a qualitative design toolbox for fashion and textile designers: an informative, accessible, and inspiring resource. It suggested that it should place an emphasis on using lifecycle understanding and design thinking approaches to evolve more innovative concepts for the design and disposal of fashion and textiles.

THE TEN

1

Design to Minimise Waste

How to reduce the many kinds of waste created within the textiles industry, both pre and post consumer? Assess the potential forward impact of design choices/decisions, on production, use and eventual disposal of textile products. Create a design narrative in response to a life-cycle analysis of the product.

Examples: slow design; design for long-life and short-life applications; zero waste cutting; design with enhanced aesthetic value.

2

Design for Cyclability

How to upcycle existing garments and how to design with virgin materials, in anticipation of future recycling? The initial design process anticipates the potential for eventual recycling and re-purposing of the textile product. Also existing garments or products considered as 'raw materials', ready for added value to be applied.

Examples: this strategy includes design for recycling, upcycling, design for mono-materiality and design for disassembly for the closed-loop systems of the future. Think re-useable/non-invasive installation or renewal.

3

Design to Reduce Chemical Impacts

How can the use of harmful chemicals at every stage in the life of the product be reduced by design? Select the most appropriate material and processes for any product to minimise environmental impacts.

Examples: seek organically produced materials; use mechanical technology to create non-chemical decorative surface pattern; create effects to replace materials and processes known to be harmful.

4

Design to Reduce Energy and Water Use

How to conserve water in the production and use of textile products? Evaluate the ways water and energy are consumed in the processing of textiles. Assess the carbon footprint, particularly in consumer laundry.

Examples: In the production phase: exhaust printing and dyeing; dry patterning systems; air-dyeing; distributed manufacture. In the use phase: design for no/low-laundry; 'short life' textiles; technical coatings to reduce washing; innovative and informative labeling; localisation; natural energy systems.

5

Design that Explores Cleaner/Better Technologies

How can technology be used to make more sustainable textiles? Design for new technologies to save energy and materials. Reduce environmental damage in the production of yarn and fibre, the construction of fabrics, dyeing and finishing of products.

Examples: bio-based materials and processes; 3-D printing; laser; water-jet; sonic cutting; sonic welding; digital printing; 're-surfacing' of polyester; novel dyeing techniques; digital finishing; tagging.



Figure 4: The revised TEN strategies, v2 (Earley & Politowicz, 2012)

2.1 aims and objectives

The original aims and objectives of Project 3 were:

New Design Decisions. Examine the range of decisions that designers make during the product development phase in order to gain new insight around which decisions improve a product's environmental and social profile.

To do this we intended to use the framework of TED's The TEN (figure 4) and refine it within the context of the Swedish fashion industry, with a range of different stakeholders, so that we were sure we had the right strategies, tools and best current best practice examples at the outset.

We also intended to spend some time familiarizing ourselves with the stakeholders in the project network, and through discussion, informal workshopping and brainstorming, make sure the project was asking the right questions.

New Design Models. Create new models for more sustainable alternatives for different design stakeholders.

Taking into consideration the data from above, we intended to develop and deliver action research workshops to the stakeholders, in order to create new design concepts, and product redesign concepts, noting and sharing which design decisions they made and what improvements occurred.

From this objective we then used the range of decisions taken to advance the concepts further, into the realm of proposals for systemic change, by using practice-based research approaches to create new models for materials, garments, processes, systems and services.

New Design Tools. Create new tools and resources for the stakeholders to inspire, educate, engage and connect.

From the outset the project used a dedicated website to collate information and build the stakeholder network. Textiletoolbox.com was intended to be the holding place for a multitude of new tools that could be shared and tested throughout the life of the project.

2.2 audience

We proposed to work directly with key design stakeholders in emerging, small, medium enterprises (SME) and large organisations, and also reach a broader, more diverse audience through the project web platform (table 2). The project brief was focused at the outset on the user value that would be gained through the research. The design of the working relationships would need to enable rigorous enquiry with speed of delivery and dexterity of translation.

Industry Influencers: Directors of key organisations and departments, such as the Sustainable Fashion Academy (SFA) in Stockholm; the New Development Team (H&M); Professors at Konstfack University College of Art, Craft and Design.

- **Large Corporations:** Design / manufacturing / marketing / retail company design team members at H&M.
- **SME's:** Graduate and professional designers and buyers working in SME's delivered primarily through a new module at SFA.
- **Emerging Designers:** Tutors and teachers, through collaboration with UAL and Konstfack; BA and MA design students, through projects within the curriculum.
- **Global Web Platform Audience:** Extended global audience of designers, researchers, students, consumers and educators.

PLAN	ACT	OBSERVE	REFLECT
Identifying Informing Organising	Trialling Collecting Questioning	Analyising Reporting Sharing	Evaluating Implementing Revisiting
STAGE 1: Identifying the Questions with Stakeholders	STAGE 2: Developing and Delivering the Workshops	STAGE 3: Curating, Designing, Making, Exhibiting	STAGE 4: Evaluating, Revisiting & Communicating
New Design Decisions Q1: <i>Which sustainable design strategies do designers in fashion companies find inspiring?</i>	New Design Models (a) Q2: <i>Which sustainable design strategies do designers in fashion companies find most useful when redesigning and improving products?</i>	New Design Models (b) Q3: <i>Which sustainable design strategies can be combined to create new models that signal systemic change?</i>	New Design Tools Q4: <i>Which tools can help stakeholders redesign and design products and systems for a more sustainable industry?</i>
Industry Influencers	Designers in Large Companies, SME's and Emerging Designers	Global Web Platform Audience	Global Web Platform Audience

Table 2: Project 3's stages, tasks, research questions and audience

2.3 research questions

Plan, stage 1:

Which sustainable design strategies do designers in fashion companies find inspiring?

Act, stage 2:

Which sustainable design strategies do designers in fashion companies find most useful when redesigning and improving products?

Observe, stage 3:

Which sustainable design strategies can be combined to create new models that signal systemic change?

Reflect, stage 4:

Which tools can help stakeholders redesign and design products and systems for a more sustainable industry?

2.4 the transitory textile designer

Alongside the challenge of improving products and market share, the desire to envision ideas to address real *systemic change* for the Swedish industry motivated the TED team to explore more fundamental and future-focused research ideas through the PhD Project by Clara Vuletich.

2.4.1 introduction

Where the primary focus of the MFF consortium projects was on the technical and material in the fashion supply chain, the P3 PhD research aimed to focus on the social; and the future role of the hands-on (craft-based textile) designer (figure 6). This opposing focus initially proved to be a challenge for the PhD research aims and objectives. However, the MFF industry context transpired to act as a unique and valuable framework for exploring craft-based sustainable textile design practice in the fashion system.

The PhD Research operated as a 'satellite' project to both the P3 and MFF projects, and involved both individual and collaborative research tasks. A number of the research tasks were performed collaboratively with the P3 team members (H&M Workshops; SFA Workshops) or with other MFF Researchers (Stockholm School of Economics, Copenhagen Business School and fieldwork in China).



Figure 6: Clara Vuletich (left), PhD researcher for Project 3, June 2012

2.4.2 the project

The TEN design strategies and workshop methodology had previously been prototyped extensively with designers in education and industry. The PhD Researcher had contributed to this activity, and had utilised the strategies through personal textile practice. The initial aim of the Research was to extend the strategies towards design that supports producers in the fashion supply chain (TT 7 Design for Ethical Production). The Research evolved to define the context of the practice as Design for Social Equity. The investigation was to explore new roles for textile designers 'beyond the swatch/cloth' in industry contexts and to understand the importance of individual values and the self in Design for Social Equity.

The Research consists of four Projects that follow an iterative action research cycle through a range of emerging enquiries and insights. After the initial Literature Review, the first Practice Project explored a Design for Social Innovation approach in an industry context (figure 7). The next two Projects involved the Researcher as a Facilitator of workshops in industry contexts, exploring new roles for textile designers and understanding the importance of individual values in sustainable design. The final Project synthesises the key insights through the creation of a hand-stitched jacket.



Figure 7: Design for Change bags, VF Corp commission, 2012

2.4.3 aims and objectives

The aims of the PhD were to explore new roles for textile designers in the transition to Design for Social Equity in the fashion textile system. The objectives were:

1. To critically review The TEN and understand transition from Sustainable Design to Design for Social Equity in fashion textile system (*Initial Contextual Review*)
2. To explore through practice new roles for fashion textile designers in industry that extend TED's The TEN to Design for Social Equity (*Projects 1, 3, 5*)
3. To understand through practice, the importance of individual values in the context of Design for Social Equity (*Projects 4 and 5*)
4. To propose new tools to support fashion textile designers in the context of Design for Social Equity (*Green Cards, Sutra Stitching Workshop*)

2.4.4 audience

The intended audience for this Research includes professional fashion textile designers in industry, both in companies and operating as SME's or sole traders. The insights are also useful for professionals in Corporate Social Responsibility (CSR) and supply chain management capacities in larger fashion organisations.

The academic audience for the Research includes textile and fashion design educators and practice-based researchers. The focus on the cultural and subjective aspects of sustainability will be of interest to sustainability and transformation researchers. Finally, the Research would be useful for artists and other creative practitioners interested in socially-engaged methods.

2.4.5 PhD project timeline

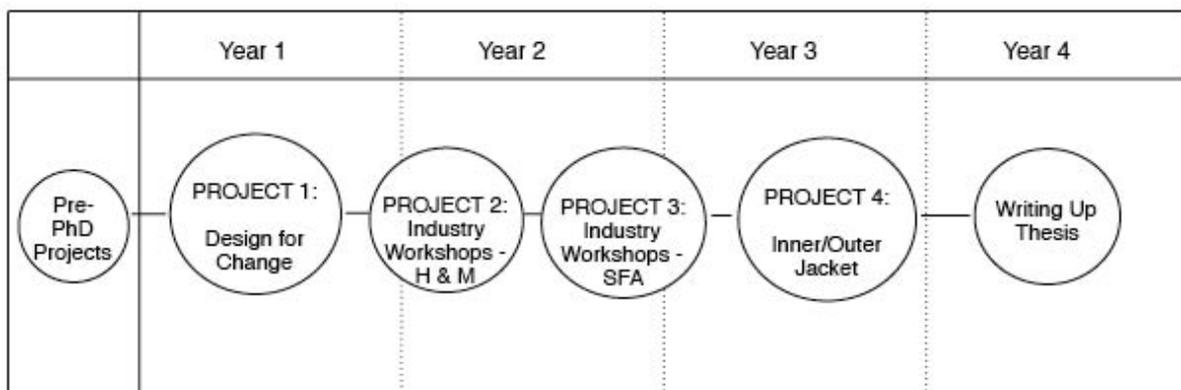


Table 3: The PhD Project Timeline

2.5 research project tasks & deliverables

In this action research project, the researchers worked directly with participants as co-researchers, on an iterative cycle of learning, reflection and action. Like the collaborative methodologies such as co-design and participatory design, the participants in the research task were encouraged to build new knowledge together with the researcher. For the P3 Project, there were several action research processes/tasks that occurred simultaneously. The Project Leader was Rebecca Earley and the 'participants' in the action research process for the project were either the participants in the workshops and/or fellow researchers. As there were several research tasks and processes going on simultaneously, the participants did not remain the same throughout the research. It was Earley as the Project Leader who carried the research enquiry and used the interactions with different actors to answer and reflect on the enquiry.

In a social science context, an action research process would involve the identification of a question and the gathering of data to answer the question, through a process of methodological rigour and analysis. In a creative research context, an action research process involves the researcher 'answering the question', through a creative process of synthesis, and the outcomes of this creative process (textile artifacts, films/animations, online exhibition) are then analysed for their usefulness or insight. Equally, the facilitation of group learning workshops was used here as a method for gathering information, answering questions, and reflecting on the issues.

The fundamental nature of action research is a change process, where the researcher consciously studies something in order to change or improve it (Berg). This change process occurs through experimentation and the integration of practical outcomes that are relevant for the participants' actual situation. This is therefore a well-suited methodology for research tasks that are working to transform the fashion industry at a systemic level through design (and the subsidiary task of identifying useful methods and skills for textile designers in sustainability contexts). As Senge explains:

There is no alternative to learning through experimentation. Bench-marking and studying 'best practice' will not suffice – because the prototyping process does not involve just incremental change in established ways of doing things, but radical ideas and practices that together can create a new way of managing. (2006:256)

By designing and facilitating a range of projects and workshops, Earley was enquiring into a set of related research questions. She was able to observe and study a situation, and then act as a facilitator of a change process, whether that was through the delivery of a workshop; curation of an exhibition; or the creation of a textile artifact. The participants who were involved in the research task – whether they were the participants in a group learning experience or the designers who were commissioned for the exhibition – learnt new approaches or concepts, which they are ideally able to apply and develop in their own contexts. As the Project Leader, Earley was also involved in a learning process, by developing a deeper understanding of the context and possible courses for action towards change.

The action research process involved four basic stages:

- 1) **Plan:** Identifying the Research Questions
- 2) **Act:** Delivering the Workshops
- 3) **Observe:** Curating, Designing, Making, Exhibiting
- 4) **Reflect:** Evaluating, Revisiting and Communicating

2.5.1 plan: identifying the research questions

PLAN: Identifying the Questions with Stakeholders (Stage 1, June 2011–August 2012)

<p>New Design Decisions <i>Q1: Which sustainable design strategies do designers in fashion companies find inspiring?</i></p>	<ul style="list-style-type: none"> • Landscape: Internal Review of The TEN Cards; website brief and blog briefs; web platform texts, images and films • Discussions, mini workshops and meetings with stakeholders to define the model for programmes at H&M, SFA and Konstfack • PhD: Full project proposal (RF3) and practice project (Design for Change, 2012)
<p>Audience Industry Influencers</p>	<ul style="list-style-type: none"> • Johan Ward, H&M • Mike Schragger, SFA • Helena Soderberg, Konstfack UC • Lorna Bircham, MA course director, CCW, UAL • CEO's at VF Corporation

Table 4: Planning, stage 1, project 3

- **Landscape: Internal Review of The TEN Cards; website brief and blog briefs; web platform texts, images and films**

This first stage involved a review of The TEN strategies and cards for the Swedish industry context. The team and external collaborators used a revised version of The TEN to review current best design practice in Sweden and globally by publishing a series of themed blog posts on the specially designed project 3 site, www.textiletoolbox.com. The web platform was developed at this early stage to enable the team to connect more broadly with international experts, in order to begin to understand the potential 'hot spots' for development within the Swedish context. The website was to become a research and dissemination tool throughout the project; a vehicle to refine and test the strategies and ideas; and to explore ways to work with both the trained and untrained public audience.

- **Discussions, mini workshops and meetings with stakeholders to define the model for programmes at H&M, SFA and Konstfack**

This involved arranging discussions and planning sessions internally and with all the stakeholders.

- **PhD Project – Project Proposal (RF3) and Project 1 (Design for Change 2012)**

In this first stage of the project, the PhD researcher aimed to create a full project proposal (RF3); and performed a critical review of The TEN to understand the transition from sustainable design to Design for Social Equity. The researcher wrote three blog posts on the Textile Toolbox platform that explore TT 7: Design for Ethical Production;

and undertook the first creative project to test a Design for Social Innovation concept with a US-based denim manufacturer.

2.5.2 act: delivering the workshops

ACT: Delivering the Workshops

(Stage 2, September 2012 – October 2013)

<p>New Design Models (a) <i>Q2: Which sustainable design strategies do designers in fashion companies find most useful when redesigning and improving products?</i></p>	<ul style="list-style-type: none"> • Development of case study material for the educational programmes; delivery of pilot programme at UAL; generate teaching materials and tools for the workshops • Deliver workshops - create new design and redesign concepts with participants • PhD project: Review of Past Practice; Action Workshops; Field Research in China
<p>Audience <i>Designers in Large Companies, SME's and Emerging Designers</i></p>	<ul style="list-style-type: none"> • 350 Buying Office staff at H&M • 35 New Development Team staff at H&M • 104 SFA participants • 12 Konstfack MA elective students

Table 5: Acting, stage 2, project 3

- **Development of case study material, educational programmes; delivery of pilot programme, UAL; generate teaching materials/tools for the workshops**

Collecting case study material to create content for the range of educational and inspirational programmes.

This review of best practice led to designing a set of cases that captured current practice in the industry, focusing on larger-scale concepts rather than small-scale, niche craft concepts. We worked at describing each innovation in 100 words or less to make the information accessible to workshop participants, and created a narrative that linked the cases through the TEN.

In this phase the team also questioned what was missing from the strategies, and what the synergies and points of connection were between them; this led to a bespoke set of design examples being highlighted for each stakeholder group. Lead participants at H&M reviewed this selection, with the final edit becoming the Inspirational Industry Ideas keynote talk by Becky Earley for H&M Buying Office staff.

To test the edited design strategies, the team, including the PhD researcher, developed professional training programmes: which were at once both highly creative, encouraging new connected thinking that leads to sustainable design innovations; and which enabled the participants to evaluate and score the redesign work, finding ways to make use of the innovative ideas quickly and economically. We designed tools for workshops that used these cases as points for inspiration and discussion.

These workshops were designed in response to findings from the review, and with the intention of developing The TEN through practice-based design thinking approaches. Workshops were held with a variety of target audiences including the undergraduate, post graduate and textile/fashion research communities at UAL and Konstfack, and

SME's in Sweden. A larger pilot of training and design workshops were held at H&M, Stockholm to represent larger companies in the research programme. During all workshops the designers were encouraged and supported by the TED team to work in a cross-disciplinary and innovative manner – particularly when strategies 6 – 10 were being considered.

- **Deliver workshops – create new (re) design concepts with participants**

The task was defined as 'to inspire' at H&M. The 60-minute keynote talk delivered by Earley at H&M's head office, to more than 350 buying office staff during Spring/Summer 2013. Inspirational Industry Ideas used case study research which landscaped ideas which were mainly actionable within a 'now' timeframe. The workshops at H&M involved working through redesign challenges with 30 designers from the New Development team over three, four-hour sessions. At SFA the redesign workshops focused on using the Higg Index to score a product before, and after, the inspirational and educational creative process with the team. This workshop took place over two days. The Interconnected Design Elective task for MA students at Konstfack was strategic in equipping future design graduates with the vision to attain design goals for sustainability. Through creative writing, manifesto making and prototype development, they were encouraged to align their personal ambitions in textile design with material and social improvement.

- **PhD project – Literature Review**

The Researcher was involved in the design and delivery of the H&M/SFA action workshops, and used interviews with key staff to gain feedback on Practice Project 1. Concurrently, the Researcher carried out a review and analysis on past practice, in order to identify sustainable textile design epistemology and methods, and to map the evolution of practice from materials to social engagement. Following the analysis of past practice, and the action workshops at H&M, the role of values in sustainable design behavior emerged as a new enquiry. A further review of the sustainability literature revealed the relationship between behavior and psychology, and the notion of a 'whole self'. The concepts of values and self-hood were subsequently explored through a range of action workshops with designers and stakeholders, in Sweden and China.

2.5.3 observe: curating, designing, making, & exhibiting

OBSERVE: Curating, Designing, Making, Exhibiting
(Stage 3, November 2013 – November 2014)

New Design Models (b)

Q3: Which sustainable design strategies can be combined to create new models that signal systemic change?

- Curation process and internal team workshops
- Online Exhibition with ten new prototypes
- PhD: Practice Project 2 (Inner/Outer Jacket 2014)

Audience

*Exhibition Audience;
Global Web Platform Audience*

- Specific figures and examples of reach and interactions, expo
- Specific figures and examples of reach and interactions, online

Table 6: Observing, stage 3, project 3

- **Curation process and internal team workshops**

The task was to develop content for an online exhibition that would highlight the design ideas and insights generated during the earlier stages of the project. This was intended to be the synthesis stage, where redesign concepts and workshop data, would be used to guide curatorial decisions. The internal team workshops would help the researchers decide on their own specific 'hand' of cards by nominating a lead card.

- **Online Exhibition with ten new prototypes**

A web-based exhibition would display new textile prototypes, design concepts, and models; and also invite feedback and interaction. Selected participants from the Project 3 team and a number of external designers were mentored and supported to connect up the design ideas and concepts generated in earlier tasks, thus enabling the researchers to design beyond the initial written concept into physical samples and ten prototype products. During this final phase of the project the main activity was to create and present the research team's material models in an exhibition format. This phase also included reviewing the participants' and the publics' feedback from the workshops and the online exhibition platform and tour (figure 8).

- **PhD Project – Project 4 (Inner/Outer Jacket 2014)**

The Researcher undertook field research to China, to investigate opportunities for a Design for Social innovation project in Chinese garment production contexts. An outcome during the field research was the facilitation of a creative workshop for garment workers to explore ethical production and values in a cross-cultural context. In conclusion to the PhD Research, a hand-made textile artifact was created for the online Textile Toolbox exhibition. The making of a hand-quilted jacket enabled the Researcher to reflect on the findings from the field research and action workshops in Stage 2.



Fig 8: The Textile Toolbox exhibition at FIT in New York (June 2015)

2.5.4 reflect: evaluating, revisiting & communicating

REFLECT: Evaluating, Revisiting & Communicating
(Stage 4 Deliverables, September 2014 – June 2015)

New Design Tools

Q4: Which tools can help stakeholders redesign and design products and systems for a more sustainable industry?

- Academic journal articles and conference presentations
- PhD project – dissertation
- Final Report, Resources & final web platform

Audience

Academic peers; Global Web Platform Audience

- Specific figures and examples of reach and interactions, publishing
- Specific figures and examples of reach and interactions, online

Table 7: Reflecting, stage 4, project 3

- **Academic journal articles and conference presentations**

During the reflecting stage research ideas would be written up and published in peer-reviewed forums.

- **The Transitionary Textile Designer – PhD thesis**

The thesis includes a discussion of the four Projects undertaken during the Research; and the outcomes that included several learning tools for supporting designers to develop a socially-engaged practice in a sustainable fashion textile context.

- **Final Report, Resources & final web platform**

The final task for the project would be to create a new online resource for the range stakeholders to inspire, educate and connect, and share the new knowledge. This being the final form of communication, the website would be built in such a way as to be self-sustaining and able to gather further feedback.

2.6 key performance indicators

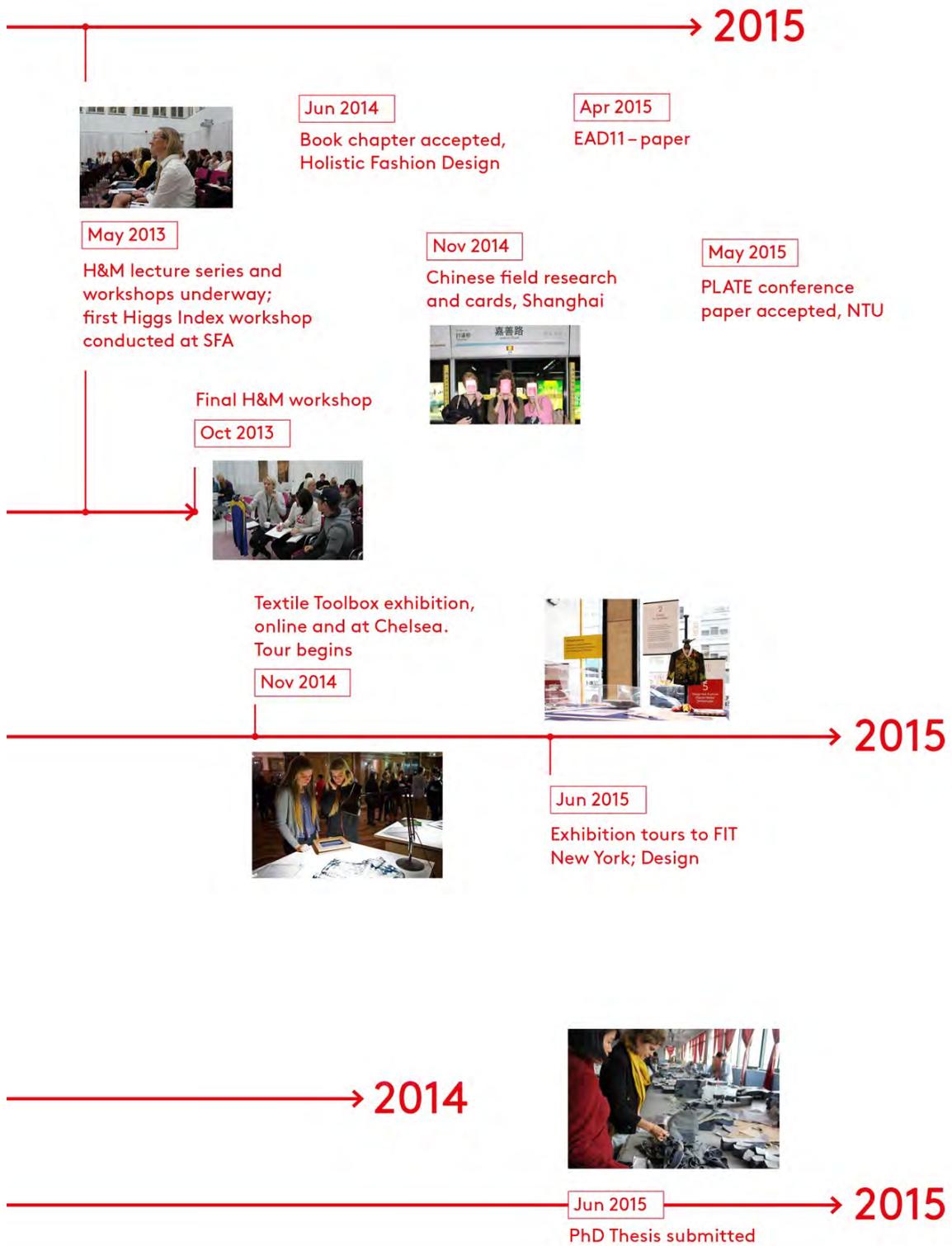
In order to gauge whether the research was being rigorously conducted, proving useful to the audience, and being value for money to the funders, a set of targets were generated by the team during stage 2 of the project. The results for the KPI's are recorded in appendix 3. (Table 8)

<p>Web Platform: popular writing; research landscaping texts & films</p> <p>Textiletoolbox website content:</p> <ul style="list-style-type: none"> • 40 new blog texts generated by internal team • 30 new blogs texts generated by external team • 6 films and animations • 3 new essays generated by internal team • 10 new essays generated by external team • 15 interviews conducted by project team <p>2013: 13,000 website hits 2014: 20,000 website hits 2015: 10,000 website hits</p>	<p>Workshops training and redesign experience workshops for a selection of the stakeholder group:</p> <p>Corporation Design Team:</p> <ul style="list-style-type: none"> • 1 pilot course for Large Companies and Corporations • 30 participants in total <p>SME Designers:</p> <ul style="list-style-type: none"> • 3 modules for SME's and Sole Traders • 70 participants in total <p>Emerging Designers:</p> <ul style="list-style-type: none"> • 3 elective modules designed and delivered • 50 student participants in total <p>Academic Researchers:</p> <ul style="list-style-type: none"> • 10 workshops with internal project team (with 15 participants) • 5 workshops with external project team and consortium members (with 40 participants)
<p>Web Exhibition new design research briefs, prototype designs, exhibition visitors and global audience:</p> <ul style="list-style-type: none"> • 50 new garment concepts • generated on paper through project workshop • 8 new concepts generated as prototypes • 5 films and animations • 25,000 online visitors • 500 sign ups • 200 downloads • 10 open exhibition submissions • 10 mentions in newspapers, periodicals and trade publications • 10 mentions in online articles • 500 members/followers to social media sites: • Facebook and Twitter 	<p>Academic Publishing journal Articles & conference presentations:</p> <ul style="list-style-type: none"> • 2 peer reviewed journal papers published by internal team members, as single or co-authors • 1 peer reviewed paper published by external team members • 5 peer reviewed/selected conference presentations • 2 peer reviewed conference publications • 2 peer reviewed conference workshops and/or posters <p>PhD Project workshops, design items, publishing:</p> <p>1 PhD completion via viva exhibition 1 PhD completions via 30,000-word thesis</p>

Table 8: KPI's, project 3

2.7 project timeline





process & methods

pp.35–51

3 how did we conduct the research?

3.1 iterative design research methods introduction

Practice-based design research is a relatively young field of enquiry compared with scientific disciplines and there is ongoing debate about appropriate methods to generate new knowledge. Research within scientific disciplines employs systematic inquiry to establish facts and develop principles, whereas creative research aims to envision 'possible futures'. A framework for textile design research with a sustainable agenda has been constructed over recent years from both practice-based creative research and social science research. Qualitative research methodology uses a 'bricolage' approach (Denzin and Lincoln 1994:2), which "calls not on the power of rationalisation and methodological examination, but on the power of human imagination and open-minded exploration" (Walker 2013).

3.1.1 practice-based research

In practice-based research, each project builds on the insights and reflections from previous projects, and the broader research agenda becomes a cumulative process of inquiry, learning and knowledge advancement. (Walker 2013)

This process generates insights from constant experimentation with materials, forms and processes, described by Earley in 2011, with reference to the Worn Again project:

It was an iterative process whereby design-led explorations tested existing sustainable design theory... this in turn led to the creation of new artifacts, which embodied the thinking and further reflection and redesign methods led to the proposal of new sustainable design theory (Earley, 2011: 1)

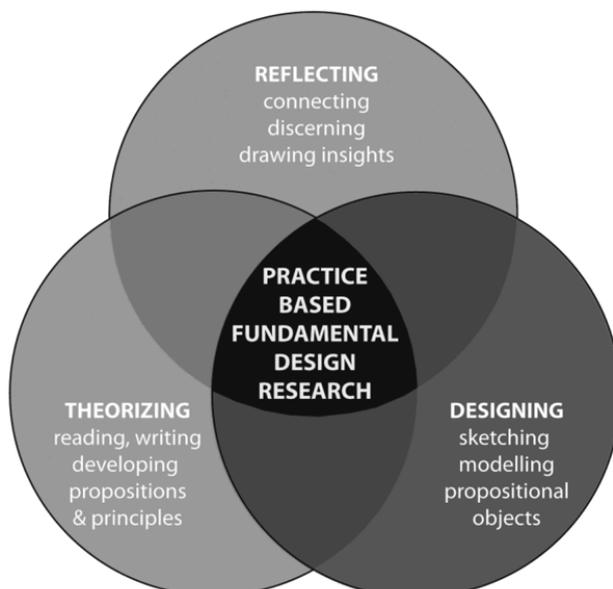


Figure 9: 'Practice-based Fundamental Design Research', Walker (2013)

- TED's primary methodological approach is through designing and making textile/fashion artifacts, which are informed by theory.
- In P3, the TED methodology has been further developed to align closely with two practice-based design research frameworks for sustainability, by Walker (2013) (Figure 9) and Goldsworthy (2013) (Figure 10).
- They comprise three similar stages – Thinking/Theorizing; Designing/Making; and Reflecting/Sharing.
- Both frameworks are based on the solo researcher designing and creating textile artifacts. The frameworks focus on the iterative and experimental aspects of working with materials, form and process, and the intimate relationship between thinking, making and writing.



Figure 10: Think, Make, Share – methods from Goldsworthy's PhD thesis (2013)

- While these existing frameworks offer useful insight into designing and making individual artifacts, the P3 Project also involved tasks that were more collaborative and social in nature, including: workshop facilitation; designer/writer commissions; a curated exhibition of artifacts.
- A new framework was devised to account for other actors as co-researchers, and for an individual researcher producing creative outcomes.

1.1.1. action research

Action research is fundamentally a change-process, where the researcher consciously studies something in order to change or improve it (Berg 2007).

Researchers work directly with participants as co-researchers, in an iterative cycle of learning, reflection and action. Participants produce prototypes and build new knowledge together with researchers, in collaborative methodologies such as co-design and participatory design.

There is no alternative to learning through experimentation. Bench-marking and studying 'best practice' will not suffice – because the prototyping process does not involve just incremental change in established ways of doing things, but radical ideas and practices that together can create a new way of managing. (Senge 2006:256)

- In P3, the TED Researchers identified the concerns and 'problems' of the Swedish fashion stakeholders (H&M; SFA; Konstfack).
- The stakeholder-participants worked towards 'better' solutions – through the facilitation of TED workshops to develop new knowledge; or the creation of textile/fashion prototypes, exhibitions and online platforms.

3.1.2 process: methods framework

- P3 Research Framework is a four-stage action research process, combined with the three stage practice-led approach of Goldsworthy and Walker (figure 11).
- The basic action research framework follows the four stages of Planning; Acting; Observing and Reflecting. Like the practice-led framework, the process begins with theorizing and planning; followed by an action stage; and outcomes are then reflected on and shared through writing.
- The difference here is the inclusion of participants or stakeholders in the process.
- TED Researchers collaborated with workshop participants by developing new knowledge together. This new knowledge was reflected on and synthesised by the TED Researchers in the third stage, *through* the making of artifacts and exhibition curation.



Figure 11: Project 3's Methods Framework, Vulecich 2015

Plan: Identifying the Questions through Thinking, Reading and Asking

Methods included: Literature Reviews; Case Study Methods; Review of THE TEN; Identifying Client Needs; Establishing Textile Toolbox Platform; Academic Writing

Act: Answering Questions through Workshop Facilitation

Methods included: Design of Workshop Tools; Researcher-as-Expert Facilitator; Analysis of Re-Design Concepts; Qualitative Interviews; Researcher Reflective Questionnaire

Observe: Analysing through Curation, Design and Making

Methods included: Designing and making of textile (and fashion) samples and artifacts; Curation of Exhibition; Audience Survey; Researcher Reflective Questionnaire

Reflect: Sharing through Writing and Digital Resources

Methods included: Academic and Report Writing; Commissioning Film Maker; Developing Resource Sheets for Website

PROJECT STAGES	TASK	METHODS
1 PLAN Identify Questions	Review of THE TEN Strategies and Current Landscape of Swedish fashion context	<ul style="list-style-type: none"> • Case Study Research • Review THE TEN framework and methodology • Academic Writing by Collaborators • Establishing Textile Toolbox web platform • Identifying Stakeholder Needs
2 ACT Answer Questions through Workshops with Stakeholders	Design and Deliver Sustainable Design Training: H&M (designers in large organisation)	<ul style="list-style-type: none"> • Develop Workshop Tools (Red Box etc) • Qualitative Interviews • Researcher as Expert Facilitator of Re-Design Process • Participant Questionnaire • Researcher Reflective Questionnaire • Analysis of Re-Design Concepts
	Design and Deliver Sustainable Design Training: SFA (SME)	<ul style="list-style-type: none"> • Develop Workshop Tools with HIGG Index • Researcher as Expert Facilitator of Re-Design Process • Participant Questionnaire • Researcher Reflective Questionnaire • Analysis of Re-Design Concepts
	Design and Deliver Sustainable Design Training: Konstfack (Emerging Researchers)	<ul style="list-style-type: none"> • Framing devices to examine the context for sustainability • Workshops in the use of TEN strategies • Personal manifesto to identify the core of individual practice • Creative writing as a dynamic tool in documenting process & discussing practice. • Prototypes & critical evaluation texts to amplify contextual thinking • Questionnaire to gather feedback • Blog
3 OBSERVE Analyse Answers	Curation of Online Exhibition	<ul style="list-style-type: none"> • Using TT method of 'hand of cards' for Structure of Exhibition? • Commissioning and Mentoring Designers to create Prototypes • Exhibition launch and tour • Audience Survey
4 REFLECT Share Results	Development of Digital Resources for Industry and Education	<ul style="list-style-type: none"> • Writing Scripts and Commissioning Animator/Film Maker • Commissioning Resource Sheets for Web Platform

Table 9: The project 3 methods mapped into the framework

3.2 PLAN: identifying questions and landscaping

The initial stage of the creative research process begins with reading, thinking, and discussing the relevant issues with stakeholders. This landscaping stage often occurs concurrently with the action stage, as researchers reflect on design actions and how they relate to the theory or 'questions'.

- TED approaches included identifying Swedish industry trends, behaviour and technologies through Case Study Research; reviewing The TEN strategies and existing methodology; identifying stakeholder needs; establishing the Textile Toolbox web platform.
- Writers, designers and theorists were also commissioned to write texts on The TEN strategies, enabling TED researchers to reflect on theoretical aspects of the strategies from a new perspective.

3.2.1 context review of the TEN

The TEN was devised as a framework to navigate the complexity of sustainability issues associated with textiles, to identify strategies for research engagement and to create positive change through design. The original aim was to map the field from the study of material life cycles, to include both reactive and proactive approaches both pre and post consumer. It also meant to serve as a way to cite and promote existing good practice through emerging international examples from industry and academia.

The TEN strategies, each presented as a bespoke card, remain a valuable tool in the development of workshops investigating sustainable design. A revised edition of The TEN created within the project intended to enable designers to convert ideas into design action without compromising their aesthetic and creative freedom.

- Research findings suggested that the titles and layout of information needed adjustment to be effective in a range of contexts. Design practice needed to be the key focus.
- The original cards had a deliberately informal and discursive style when identifying the ten target areas for investigation. Each card and strategy was redesigned with a research question, a statement summarising the design implications and generic illustrations of possible actions.
- The body of the text also was changed to distinguish environmental issues from development goals and to identify target areas for improvement more clearly. Therefore, the text on each of the TEN cards was separated into three constituent parts: first, the title was expressed as an environmental question; second, the tactics necessary to address the question; third, examples of good design practice were selected as a generic list to include brand names which would serve as prompts and directions.
- Workshop experience indicated that if the words 'Design to...' or 'Design for...' were included in the title, then design activity was seen as central to the issue under investigation. For e.g. 'To Recycle' implies 'end-of-pipe' thinking but 'Design for Cyclability' is pro-active at every stage of production, including inception. Recycled goods must also be considered as material for future recycling.

- The content and format of the TEN cards need to be developed and updated regularly to remain relevant and effective.

3.2.2 industry case study review

The industry case study review of The TEN was achieved in different stages.

- A review of the database and archive of TED presentations built the first body of examples for the case studies, including: keynotes; teaching material; a network of TED research events.
- The inclusion of a paid internship program built a library of industry examples from key online resources, newsletters, websites, blogs and publications outlined by TED researchers for current industrial practice. Subsequently, patterns emerged of sustainability implemented in industry, from industrial examples selected as 'cases' to illuminate each strategy,
- This led to subsections of examples within each strategy, highlighting different approaches. This structure communicated the case studies as part of the lectures and handouts at H&M. TED research team members analysed the examples for a TED code with the lead strategy and secondary strategies.

3.2.3 the web platform as research method

Textile Toolbox website was used as a portal for the research and to build the discourse around The TEN.

- Online platform was driven by the research deliverables and connected to generating user value, as a tool for engagement of a wider audience
- The platform was linked to the outputs of two deliverables of the research project, first as a public tool for research and writing and second as a dissemination platform and to showcase the exhibition.
- Briefing and collaboration with web and graphic designers to develop the platform led to a research communication tool.
- Briefing, content liaison, design meetings and the final launch were part of the process for the first and second phase of the web platform: the first stage included writing and the second stage the showcase of the exhibits.
- This process included: team reflections on dissemination and accessibility of the research; blog posts; tagging; categories pages supported the organization; structuring of research outputs.
- The project website was custom built in WordPress for dissemination of the research.
- Discourse around The TEN strategies was achieved through the commission of blog texts from academic partners.
- The texts, built an audience of visitors, mapped the impact and reach of the research and a visitors group established for the launch of the online exhibition.
- Response to the research was recorded through a survey published on the site. Community building of the site was linked to social media through Twitter and Facebook.

- The aim to build an open innovation platform was also achieved through downloadable resource sheets for the website visitors, and the final project report published on the site is the legacy of the platform.
- Texts by the research team on the TED, TFRC and MISTRA Future Fashion websites, including blogs and newsletters also linked to project deliverables and updates, aim to direct a wider audience to the project website.

3.3 ACT: addressing questions through action workshops with stakeholders

In the action stage, researchers use a range of approaches and methods to 'answer' the questions and concerns identified in the first stage.

- For this Project, the TED Researchers took on a 'Design Facilitator' role to design and deliver action research workshops in a group-learning environment.
- The TED team utilised the TEN framework and 'card game' methodology to facilitate a learning process with professional designers and design students.
- The primary aim of the workshops was to 're-design' existing fashion garments, to improve their sustainability profiles.
- The educational workshop programmes developed at both H&M and SFA were cycles following an action research format, running within the meta project framework: each programme, or cycle, contributing to the project's overall research insight, entitled 'progressive problem solving with action research' by The Center for Collaborative Action Research, Pepperdine University, (Riel 2010) (Figure 12).

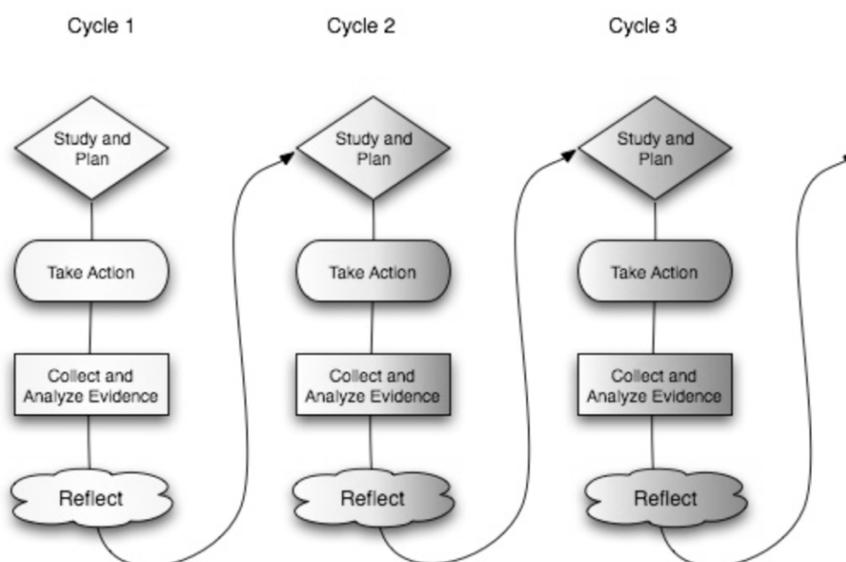


Figure 12: <https://languagelearningonline.wordpress.com>

3.3.1 facilitation of design innovation process

The TEN workshop methodology had been in development for several years prior to the MISTRA Research. The methodology led participants through a design innovation process to generate concepts and ideas after identification of the 'question' or problem. This was in itself an action research process, as the participants, working together with the facilitator, found creative answers to questions.

- By acting as consultant researchers fostering innovation, TED researchers were able to facilitate change and to observe and study a particular organisational context.
- Participants learnt new approaches to designing fashion products and systems to apply and develop in their own future professional contexts.
- TED researchers were also involved in a learning process, by developing a deeper understanding of the TEN framework and its relevance for other professional designers and fashion companies.

For this facilitation process, the researchers tested the workshop models by developing events and workshop tools as part of the dissemination activity, including the project team and external collaborators.

- TED's 24 event in June 2012 invited MISTRA researchers, associate researchers and industry stakeholders (figure 13a).
- A second TFRC Campfires event included the research team with selected external collaborators to present and audit the project deliverables.
- During these workshops, the use of the TED strategies was not structured in a hierarchical order from 1-10, as workshop participants were encouraged to develop their own sequence of strategies with a lead strategy and secondary strategies as a TED coding.
- Design innovation also included reflections on the timing of implementation of new ideas and fashion concepts in industry: 'Now, Near and Far' coding of examples became part of the H&M workshops and of the team review of industry case studies.



Figure 13a: The worksheet tools used to capture ideas in both the planning and delivery stages of the project

3.3.2 researcher as design facilitator

Designers are no longer merely designing products. They now design systems, services and organisations. Due to this shift beyond the material, designers need to develop new skills and roles as facilitators, change-makers and activists. There is a lack of clarity about definitions of the new roles for designers. Fletcher and Grose (2012) discuss 'Designer as Facilitator', whereas Tan emphasises the use of visual tools to represent ideas back to the group and the creation of possible futures rather than analysis of an existing situation. (Tan, 2012). TED Researchers demonstrated these two aspects of a Design Facilitator, as textile designers with a unique skill set based on craft-design training.

- A range of highly visual and experiential methods was used, including the TEN cards and various games, worksheets, and study/notebooks.
- The workshop methodology led participants through a design innovation process that can be seen as the 'creation of possible futures' rather than the analysis of an existing situation (figure 13b).
- TED Researchers used this role of Design Facilitator for research purposes, to study an existing situation and to work collaboratively with participants through a change process.
- The team practiced collectively for this role through consultancy and facilitation training. The process was beneficial as it created a shared knowledge and skill set towards their role as facilitators.
- The role of the designer was further understood by the work of the PhD researcher, through training of 'soft' skills and the 'self' to be part of this process for change.



Figure 13b: Rebecca Earley (right) with the New Development Team, H&M, Stockholm, May 2013

3.3.3 reflective questionnaire

- For action research workshops, TED researchers developed a reflective questionnaire to gain insight into their own experiences and responses, immediately after the event.
- The questionnaire was adapted from an 'after-action' review framework, composed of six questions, completed individually by the team. As a method of 'reflection-on-action', this questionnaire became an off-loading device.
- The researchers were able to evaluate the learning experience to inform the next stage of the process.

3.3.4 dialogue

As TED researchers have worked collaboratively over several years, the team has grown to rely on shared dialogue *on* and *in* research tasks. Textile design research individuals share the 'textile designerly ways of knowing' particular to the discipline, contributing to a shared language and epistemology. Research tasks formed an iterative process of working with both theory and practice, while a shared dialogue allowed creative researchers to reflect on unfolding concepts, problems and outcomes.

- Regular team meetings contributed to the delivery of the key research tasks during the project. Internal meetings occurred fortnightly and included brainstorming methods for ideas generation and development of the team's research tasks.
- While each project deliverable led to meetings taking place internally, the dialogue was extended to external project partners for deliverables such as H&M, SFA and Konstfack and other stakeholders of the research.

- External project partners were either invited to internal project workshops and meetings, or engaged in the research via email, phone or web meetings.

3.3.5 participant questionnaire

Researchers worked with specialist facilitation consultant Phil Hadridge (Idenk) to develop an online survey, capturing data from workshop participants at H&M and SFA.

- Participants were surveyed prior to the workshops to identify existing knowledge levels and were subsequently surveyed to identify new knowledge generated by the workshop experience.
- Results of the survey were analysed both qualitatively (thematic analysis, with illustrative quotes) and quantitatively (using a range of ways of presenting the numeric scores, and incidence of comments). The Idenk team was also commissioned to analyse the results, to check for any cognitive bias.

3.3.6 analysis of re/design concepts

Redesign concepts from the worksheets of participants after each workshop were collected or photographically documented and analysed.

- Workshop outcomes were subjected to quantitative and qualitative analysis. As workshop tools differed between stakeholder groups, the results were first evaluated for each individual workshop, through a table, structured according to the work sheet questions, to map all redesign concepts into one overview. Consequently, it was evident where concepts included reflections on key sections of the work sheet, and thus where a stronger range of ideas was explored.
- The overview also supported a comparison of concepts within each workshop, and developed a visual tool for evaluation of the redesigned garments and accessories through the table structure with images.
- Analysis was applied to all industry workshops with redesign outcomes, and each table was adapted to the worksheet used. From the quantitative analysis of responses within each workshop, the most developed concepts included reflections across the whole work sheet, i.e. all TEN of the strategies. Following individual analysis, concepts were evaluated across the workshops based on criteria, e.g. short or long life concepts.
- Similarities emerged in redesigned garments across all workshops: the evaluation recorded connected approaches for material selection, technology and services (3,4,5,9).
- Concepts with most potential for systemic change stood out and led to questions for how these could be implemented in the industry. These questions were then explored through the curation process and the mentored exhibits commissioned for the Textile Toolbox exhibition.

3.4 OBSERVE: curating, designing, making, exhibiting

The third stage of action research involves the researcher and any participants undertaking analysis and interpretation of the findings from the action stage. In scientific research, rational analysis would be used to interpret the data. In contrast to this, the TED team used creative methods to synthesise and reflect on the findings from the action stage. After compiling feedback from workshop participants, and analysing the re-design concepts, TED researchers curated an exhibition and created new textile artifacts.

3.4.1 exhibition curation

Exhibition curation created the conditions for the synthesis of the project work to occur. Earley had used exhibition curation as a research process in three earlier projects: Well Fashioned (Crafts Council, 2006); Ever & Again (AHRC, 2007); and Jerwood Contemporary Makers (Jerwood 2009). Previous methods similarly included: a landscape review process (4.2.2); discussions with the TED team (4.3.3); workshops with SME's (4.3.1 and 4.3.2); as well as commissioning and creating new prototypes (4.4.2).

- In this instance the co-curators Earley and Goldsworthy also used the analysis of the redesign concepts (4.3.5) and internal workshops. The team developed experimental ideas with The TEN cards, to arrive at new themes, explored and represented through the exhibition selection and commissioning process.
- Internal workshops supported innovation process: from reviewing interdisciplinary projects developed by design researchers beyond the original MFF deliverables; to creating project briefs to test the ideas of the co-curators and mentoring the design researchers selected for this task; to evolving new exhibits based on the project team's existing research work.
- Curation formed part of the research as it selected processes developed by design researchers for a showcase of 'Swedish fashion concepts from the future'.
- Through the mapping of exhibits against the three themes, the exhibition built a breadth of possible futures to include interconnected approaches across all The TEN strategies.
- A 'hand of cards' was developed through team workshops to accompany each exhibit and demonstrate how the strategies connect to design outcomes for different research contexts.

3.4.2 textile/fashion prototypes

The creative researcher gains useful knowledge during design and making process and in finished artifact. Walker explains: 'During the design and making process, a creative researcher engages with intimate relationships between materials, form, aesthetics, concepts and motivation.' A new fibre may develop, or insight from a consumer survey, yet without the creative engagement of the designer, the findings or recommendations from theory will remain untested and untransmuted by the design

process. Walker suggests: 'it is through the design and making process, that general theory and abstract ideas are transformed into specific and concrete knowledge.'

- Textile/fashion artifacts, created in the P3 Project, can be seen as 'propositions' for a new way of thinking about and designing fashion. Walker describes the artifacts created under Propositional Design Research as both critiques of existing conditions and approaches - and equally as 'questions-in-form' as to how these criticisms may be constructively addressed. Artifacts can act as prototypes that provoke and open up discussion amongst stakeholders in industry and academia.
- Such propositions are different to the textile/fashion design items in industry, as they are concerned with the conceptual nature of production processes and material culture. Walker suggests several ways in which these propositions can offer useful insight in the sustainability context:
 - *As a way of 'seeing' second-hand/unwanted products/materials anew and re-valuing them*
 - *A useful approach to how we view or use certain materials*
 - *A new language of design and aesthetics that has implications for how we conceive of textile/fashion products*
 - *How deeper notions of human meaning – the communal, the compassionate, the ethical – may be inculcated into our material culture*

Within the wider framework of the MISTRA Future Fashion project, these forms of 'academic' designing are essential to our understanding of a more sustainable material culture in the fashion system.

3.4.3 audience survey

- Online exhibition launched an audience survey of the landing page of the Textile Toolbox website.
- Survey captured feedback from exhibition visitors, using an online tool as a formal feedback model similar to feedback cards used in a physical exhibition space.
- Research questions of the project were thus extended to a wider audience for data capture.
- Three components for the online survey, including: carefully crafted questions piloted to test their usability and usefulness; questions hosted on an independent survey platform (via www.idenk.com), including regular reminders; and independent analysis of results for insight, including graphics to increase impact from the results.
- Findings were used to evaluate the user value of the site, including feedback on the exhibition, The TEN coding, the website and the consortium.

3.5 REFLECT: sharing through writing, collaborating and utilising digital tools introduction

The final stage of action research requires the creative researcher to share findings and insights with stakeholders and other interested parties. Methods used at this stage include: academic writing; a final iteration of the Textile Toolbox web platform; development of a range of digital resources and tools including Resource Sheets and animations/films.

3.5.1 academic writing in textile research

'The design researcher develops a theoretical position through the act of reading, making, and thinking, and this position is often articulated in an academic paper... However, the creative researcher is challenged to find an effective way to present the tacit and implicit knowledge of a creative practice as text.' (Walker 2013)

- PhD researcher developed several methods for writing academically including 'Patchwork Writing', based on her own textile making approach.
- Earley and Politowicz encourage fictional and creative writing to help designers articulate intuitive action.

3.5.2 collaborating and utilising digital tools

The TED team has established a diverse set of creative research approaches since its inception in 1996, including methods from other fields enhancing access to software and digital tools, working simultaneously on projects and processes. Such approaches: support the research; manage data; build audience and impacts; communicate effectively during the process and outcomes.

- Planning Phase graphic design collaborations for publications: TED cards and H&M tools, including the new TEN cards in English, Swedish and Chinese. (Two translators created appropriate language).
- Work sheets designed by the team were tested and the graphics refined or updated. Following an iterative research process they were adapted and updated for different research stakeholders, eg. H&M and SFA worksheets focused on different TEN strategies.
- Presentation software used to map thoughts visually before committing ideas to writing. For this slides and images were created in Ppt, Prezi and Keynote.
- Prezi is used extensively with H&M, to make the keynote talks dynamic. Also used creative software tools: Adobe Illustrator, InDesign and Photoshop.
- Acting Phase workshops encourage participants to use: drawing and sketching to show research processes; models: visions of future scenarios; diagrams; spider graphs; mind maps and tables.
- One invaluable tool was file sharing through a shared TED Dropbox account. Working between the UK, Sweden, Denmark, Australia and China, the researchers

found this essential, meaning that for example photos for blogs were able to be shared moments after they were made in another country.

- Online meetings needed similar software support: Skype and Lync were used to talk; and Webinar tools to teach and instruct, share and coach.

In the observing phase:

- Collating data from events via audio recordings: voice memos /audio recorders.
- Transcription service generates texts for reflecting, editing and sharing.
- Digital photographic record of events and fashion photography of commissioned artifacts.
- Visual data archive as communication aid, to understand, reflect, trigger memories and insights. Workshop data & filmmaking are turned into ideas.
- Team collaborations with research-informed practitioners to produce researcher interviews, animation and exhibition films.
- Press statements/ interviews in observing and reflecting phases, contribute to understanding of workshop events and begin to create new narratives.
- Giving interviews, creating blog posts and articles for external platforms or print publications.

In the reflecting phase:

- Web designers build the communication approach:
- Community building: website email sign ups, newsletter and invite send-outs.
- Email groups via Mailchimp targeted for different, specific project deliverables.
- Google analytics tracked site visit numbers: geography of users; most visited sites/ pages.
- PDF resource tools downloaded from the site recorded user profiles against tools.

4 what did the research reveal?

Overall the project has made several key contributions to the field of design strategy for the Swedish fashion textile sector, including adapting TED's The TEN framework for a series of interventions that aimed to extend the current sustainable textile design landscape for Sweden within an international context. This work has resulted in multiple insights:

- The skills and support textile designers may need when participating in the transition to a more socially connected industry
- How to support new design decision-making in practices of all scales
- Textile strategies to create new design and service models, and prototypes for sustainable fashion
- The use of innovative digital media design tools to support and inform this process.

The following chapter describes the work carried out with multiple stakeholders and discusses the resulting revelations according to these themes.

New Design Decisions

This task led to the following insights around designers and the decisions they make. This was explored throughout tasks in stages 1 & 2 of the project, firstly through a landscape review resulting in initial training materials for both academic and industry audiences (SDI keynote, landscape review, TT blog posts, elective lectures). Followed by stakeholder workshops with corporations (H&M), SME's (SFA) and emerging designers (Konstfack).

New Design Models

We audited garments and created redesign concepts in the H&M and SFA workshops. We generated 35 new sustainable garment concepts spanning from long life to short life models. Developing a collection of conceptual design items that 'prototype' theoretical ideas in a sustainable textile/fashion context can be a useful device for communicating concepts to different stakeholders; the curatorial process that followed the industry workshops was the synthesis stage of the research project, and specifically developed insights gained from the research conducted during stages 1 and 2, but moved the thinking more into the realms of proposals for systemic change, rather than product improvement and redesign.

New Design Tools

We developed different tools to: design and redesign sustainable fashion textile garments; communicate ideas internally and externally; draw out insights from participants on how change can take place, making connections across departments and disciplines; build new audiences and modes of participation. The tools represent significant outcomes for the project and are to be published in a separate book at a later date.

PhD Research Project Results

The key findings include a critical review of The TEN, with a focus on the 'social'; the development of several models to represent new design roles in Design for Social Equity; a range of tools to support designers working in this context; and defining sustainability and textile-making as transitional (Transitional Textiles).

stakeholder workshops

pp.53–90

Which sustainable design strategies do designers in fashion companies find inspiring?

4.1 new design decisions

This body of work responded to Aim 1: *Examine the range of **decisions that designers make** during the product development phase using the framework of TED's The TEN.*

From "1: Minimise Waste" to "10: Activism", The TEN strategies identify design engagement from material concerns to ethical production and the impact on society. Through a consideration of the whole lifecycle of textiles, designers can make appropriate decisions about materials, process, structure and form, using the strategies to develop tactics to deal with these choices. The strategy order largely follows a chronological sequence of the way in which technology has developed and design has evolved in relation to sustainability.

In 2012, it became clear from using the cards in workshop situations with designers in large and small companies (SFA, H&M) and students (UAL, Konstfack), that it would be preferable to make a more systematic layout for the information presented under each heading. Originally the cards defined the idea contained within the title, in informal language as accessible as possible, without jargon, so enabling designers to position themselves on a spectrum of enquiry into sustainability.

We found that a stronger message for action could be conveyed by the use of the words 'Design to...' or 'Design for...' in each title of The TEN cards.

The title thus identifies both the aim and a design action simultaneously. Each strategy was rewritten as a research question, focusing attention on overcoming the barriers to achieving the aim. By using the cards singly or in groups, the designer could locate a critical position more precisely. Finally, each card proposes a set of appropriate actions and generic examples of use in developing relevant ideas for investigating what has become a constantly growing field.

4.1.1 sustainable textile design now

This was an online Review of The TEN Strategies within a Swedish industry context. This body of research was concerned with identifying characteristics of the contemporary Swedish sustainable fashion market in order to highlight potential for systemic change.

We proposed to dig deep into each strategy to uncover patterns and examples that provide an overview of the current sustainability landscape. We responded to this brief using two approaches: an industry review of sustainable design strategies in large

companies, and an academic review of the strategies that scoped the geographical location. The academic exploration for the strategies was framed around the strategic approaches within each of The TEN, placing Swedish examples within a global context.

The industry examples were mapped against scale to highlight strategic sustainable design approaches in large companies.

One of the key questions in sustainable design is how to upscale innovative strategies for sustainability, and how designers in small, medium and large companies can consider a holistic approach. The landscaping of the industry case studies and academic review have highlighted the advantage of interconnected approaches for sustainable textiles and fashion.

This review process is based on the texts of a network of academic partners that were commissioned to write about each The Ten strategy. The texts are based on their expertise in academic research and industry with reflections from industry partners. The commissioning process also included a 'Synergies' section where selected writers reflected on the strategies through examples that demonstrate an interconnected approach.

The industry review was achieved through case study research between June 2012 and the start of the workshop program at H&M in April 2013. The selected examples responded to current or recent innovations in industry mostly between 2011 and 2013, the time frame of the project start until the workshops delivery. Within each strategy, the industry developments were grouped into subsection of approaches. Through a team review process, we have coded the industry examples according to lead strategy and secondary strategies. The TED coding as a method was developed in 2012, and we have applied this in workshops and in the review of industry examples throughout the MISTRA Future Fashion project.

4.1.1.1 Swedish Sustainable Design

Most potential for systemic change was found in a wide range of small organisations and individuals. Upcycling opportunities are strong in small companies.

In the academic landscape, each Swedish case study was placed in an international context for thematically connected explorations. This highlighted the gaps and strengths of the contemporary Swedish sustainable fashion market (table 10).

The TEN strategies in the academic review

Zero Waste pattern cutting researcher Dr. Timo Rissanen outlines how Nordic countries include such approaches through referencing historic examples or through upcycling strategies. Pre-consumer waste in Sweden is not considered when production is 'out of sight' (Rissanen, 2012). In the review of Swedish recycling and upcycling initiatives, Sass Brown (2013) states that 'there seems to be a complete dearth of designers in Sweden working with pre consumer waste, making this an opportunity for small, artisanal designers to access unique materials at low or no cost, small scale manufacturers to find ethical means of eliminating their waste through donations

direct to designers, and large scale manufacturers to utilise their waste at source through designer collaborations.'

Brown (2013) outlines how working with pre or post-consumer waste would include more labour costs and eliminate material costs. Setting up connections between manufacturers and designers directly would cut out the middleman and increase the upcycling initiatives. The lack of designers in Sweden working with pre consumer waste is determined at the outset as manufacture by Swedish brands is mainly outsourced.

GAPS	HOT SPOTS
Missing zero waste approaches: There are no initiatives to work with pre-consumer waste in Sweden due a supply chain that is 'out of sight' (Rissanen, 2012).	Denim is a long life garment typology in Sweden: Denim garments are a key element of Swedish fashion due to the local style and industry. As a garment it has potential to build a relationship with (Chapman, 2012), and for low wash strategies (Rigby, 2013).
Barriers to input into chemical reduction when the supply chain is outside Sweden: Strategies 3 and 4 require strengthened links to the supply chain to reduce impacts.	Swedish brands consider appropriate labeling and communication of sustainability credentials: for example less wash and repair strategies (Rigby, 2012).
Swedish production is outsourced: This leads to less input on pre-consumer waste, chemical reduction in the supply chain and increased efforts to map ethical production (Brown, 2013).	The style of garments is durable and practical (Harper, 2012): The design has been adapted to a modern and democratized Swedish lifestyle, becoming a fashion reference worldwide (Sven-Harry's Art Museum, 2014).
Barriers to up scaling innovation from small Swedish industry to large Swedish fashion industry: While the communication of sustainability approaches is one of the key strategies for large industry, the innovation of small businesses that achieve more holistic sustainability approaches can not be up-scaled and implemented for large companies.	New start-ups experiment with sustainable business models: Small-scale Swedish initiatives (Gwilt, 2013) have flexibility to include holistic approaches for sustainable (von Busch, 2013).

Table 10: Textile Toolbox analysis of gaps and hotspots of the sustainable Swedish landscape

The reduction of chemical impacts is achieved through the collaboration between manufacturers and companies leading the way in innovation of materials and dyes. Reduction of chemical impacts succeeds when the chemical industry considers holistic approaches (MacLennan, 2014), and when collaborations of designers with industry stakeholders such as scientists lead to initiatives that reduce energy and water use (Rigby, 2013). Sweden's recycling model, where most textiles are being incinerated at the end of life (Palm et al., 2013) is shifting towards research in closed loop chemical recycling and local manufacture of regenerated cellulose fibres.

Reducing water use in Swedish companies is explored more in the use phase than in production. Swedish and Nordic companies are leading the way in research and initiatives that reduce water use in laundry behavior, and connect this to consumer studies. Large brand Nudie Jeans considers this through material selection, new processes and consumer communication. Nordic countries have produced research

reports for consumer studies that consider behavior change to reduce wash, including its connection to material selection such as wool (Rigby, 2013).

The strength of Swedish designers in this review is to design durable garments or to experiment with materials from local resources such as paper, both approaches that value and consider models from historic examples (Aspinall, 2012). The creative input by designers is seen in Swedish examples such as Bea Szenefeld, Anya Hynanen and Restructual Clothing. The Synergies section includes examples where style and aesthetic are valued through business models initiatives that resell old lines, clothing libraries or revalidation of classics in a local context (Harper, 2013).

More ethical approaches in the supply chain and manufacture of garments are visible in the rest of Europe where there are more opportunities and regulations for transparency in the supply chain. Ethical production models are possible as small makers produce locally (Brown, 2013).

Jonathan Chapman's investigation in 'Reducing the Need to Consume' (2013) includes examples that can be applied to a Swedish context. The strength of the Swedish industry for durable and long lasting design is presented with the example of denim in strategies 4 and 8, where the authors point out its durability and the opportunity to build a relationship for long life and low wash. Alison Gwilt (2013) complements this section through synergy examples where local Swedish initiatives encompass many strategies including activism, systems and services.

Most potential for systemic change was found in a wide range of small organisations and individuals. Upcycling opportunities are strong in small companies. These initiatives also lead to having clothing libraries, denoting a democratic intention that could lead the collaborative consumption drive globally (von Busch, 2013). One potential development for fashion services lies in the connection with clean and better technologies. Digital printing can lead to consumer involvement through fashion services: models from print on demand in press such as the Swedish 'Meganews' can be extended to future fashion services where garments are customised with personalised prints (Bowles, 2014). Storytelling and communication of brand credentials are widely applied in Swedish companies (Ballie, 2014) and connect to consumers through social media.

Design Activism as a counter-movement to 'fashion supremacy' (von Busch, 2013) is explored in the Swedish context of garment libraries, connecting examples of small and new establishments to systems and services. Design Activism is mostly confined to small initiatives; however, the flexibility of start-ups allows for experimentation of business models where the designer is changing the way garments are distributed. Art schools are well placed to produce new thinking, but once employed in companies a glass ceiling means that radical ideas are hard to follow through as the design role becomes more embedded in a buying environment.

4.1.1.2 Scaling up ideas

The academic landscape also posed questions for upscaling sustainable design ideas in large companies. The academic perspective signposts barriers for upscaling strategic

sustainable design approaches: Examples of small scale and individual initiatives demonstrate that these achieve a consideration of interconnected strategies with a holistic approach. The review highlighted how successful projects included more than one strategic reflection, and different synergies manifested themselves between strategies.

Within a Zero Waste context, Rissanen outlines that it is difficult to upscale this model when the aim is to achieve lowest price: This could be possible in a 'decentralised fashion' with more entrepreneurs using these lean manufacturing models (2013). To achieve large scale upcycling there is a need to 'standardise materials' (Brown, 2013). It is increasingly common for large-scale initiatives in industry to embrace laundry behavior change through appropriate labeling and communication of wash instructions to consumers. This does not include changes in the product itself, however changes in the material selection, production and labeling. Small-scale approaches allow for innovative changes in the design that reduce water consumption that is derived through frequent wash. This deviates from a conventional aesthetic, and is a barrier in large industry where standardised garment shapes are most commonly used.

Ethical production models in large industry are possible through the involvement of designers as facilitators. Models for ethical production in large-scale industry are mapped according to initiatives with the workers in the supply chain, changing the production context for workers: small artisanal communities are involved in the design process (Vuletich, 2014). The examples focus on production contexts in Bangladesh or India, key reference points for the supply chain of large industry, signposting how ethical production can be achieved through the involvement of a designer with the local workers or artisans.

Large brands that are represented worldwide are recognised at international level as agents for change to reduce impacts in the fashion industry. Large industry focuses on changes in the supply chain, while examples that consider the use phase include non-infrastructure initiatives that involve the consumer through communication, social media and technology.

Within a global landscape of case studies, small organisations and individuals have the most potential for interconnected sustainable design approaches that consider systems and services. While in large companies this strategy is explored through specific store experiences or products, small companies such as Matilda Wendelboe (Gwilt, 2013) or Alabama Chanin (Rissanen, 2013) embrace a more holistic approach that connects material selection to design, and the production model to consumer interaction.

Systems and services for fashion require a level of experimentation with business models that is mostly achieved in new start-ups. The success of these often relies on user-driven approaches through social media. While large companies encounter barriers to achieve changes in the infrastructure of the organisation, they have a large followers group and reach. Small companies encounter barriers to implement systems such as clothing libraries and leasing models as they require a large target group.

Small-scale production and prototypes embrace ideas for 'Design Activism' with a holistic approach (von Bush, 2013). While strategy 10 is a recurrent theme in

education, designers in large industry face many barriers when trying to implement this.

A note on Swedish lifestyle and garments style

The Swedish lifestyle reflects thinking around sustainable fashion. A recent big fashion retrospective of Swedish Fashion between 2000-2015 has highlighted how “everyday fashion and ‘dressing down’ was something Swedish designers became pioneers in”, making Sweden one of the leading clothing styles that acknowledge consumer needs. In the synergies section of the Textile Toolbox site, Kristine Harper’s article on ‘Aesthetic Sustainability’ (2012) maps how long life attachment to garments for sustainability can be achieved with two approaches: The first being something simple that always fits, a key quality of Swedish and Nordic fashion design, while the second is a multifunctional aesthetic that you never get tired of.

4.1.1.3 Interconnected Design Strategies

The landscaping exercise in academic and industry contexts against The TEN highlighted the interrelatedness of the strategies. Through the review of the landscaping in the academic and industry context we discovered models for connected The TEN strategy approaches:

The academic landscape:

The TED coding of strategies in the academic review highlighted a more interconnected approach as small companies have more flexibility in approaching their products from a lifecycle perspective. These strategy groups emerged:

HAND Interconnected design strategies	THE TEN strategies									
	1	2	3	4	5	6	7	8	9	10
HAND 1			x	x	X					
HAND 2			X		X					
HAND 3			X						X	
HAND 4	x						X		x	
HAND 5			X	X	X					
HAND 6		X						X	X	
HAND 7	X							X		
HAND 8										
HAND 9					X			X		
HAND 10								X	X	
HAND 11		x							x	X
HAND 12	x									X
HAND 13			x					x	X	x
HAND 14		x						X	x	
HAND 15							x		x	X
HAND 16	X	X	X	X	X					
HAND 17			X	X	X	x	x	x	x	x
HAND 18	X	X	X	X	X	x	x	x	x	x
HAND 19		X	X							
HAND 20										X
HAND 21		X	X	X						
HAND 22						x	x	x	X	X
HAND 23		X								X
HAND 24	x	x	x	x	X					x
HAND 25	x	x	x	x		x	x			X
HAND 26	x	X	x		x	x		x	x	x
HAND 27	x	x				x				X
HAND 28					x	x		x	X	x
HAND 29	X					x	x		x	
HAND 30		x				x		X		x
HAND 31	x	x						x	X	x
HAND 32	x	X	x	x	x	x			x	
HAND 33	x	x				x	x			X

Table 11: Data set hands of cards

hands of cards (table 11)

An overview of the 'hands of cards' in the report summarises the hands played during the workshops. This offers provides a data set showing the different interconnected design strategy approaches linked to the outcomes. Lead strategies are highlighted in red. Some hands use multiple lead strategies, while other hands connect secondary strategies to a leading strategy.

The lead cards most commonly played were:

- 10 Activism (9 times)
- followed by 3 Chemicals
- then 2 Design for Cyclability
- 5 Technology (all 8 times)
- Models from Nature and History (6) was never played as a lead card.



Figure 14: Hand 5 plays strategies 3, 4 and 5

Figure 14. Strategies 3, 4 and 5: Reduction of chemical impacts (3), energy and water use (4) is often connected with explorations in new technologies (5)

Figure 15. Strategies 2, 8 and 9: Upcycling (2) and repair is often connected to repair services and fashion libraries (8, 9)

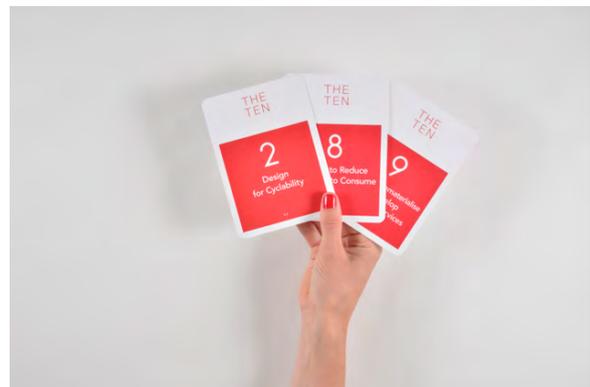


Figure 15: Hand 6 plays strategies 2, 8 and 9

Interconnected strategy approaches in large companies:

The review of international large-scale initiatives for the Swedish brand H&M mapped opportunities for a sustainable supply chain that connects more strategies in their approach. The industry examples were structured into subsections that reflected these. These sections highlighted dual relationships between strategies.

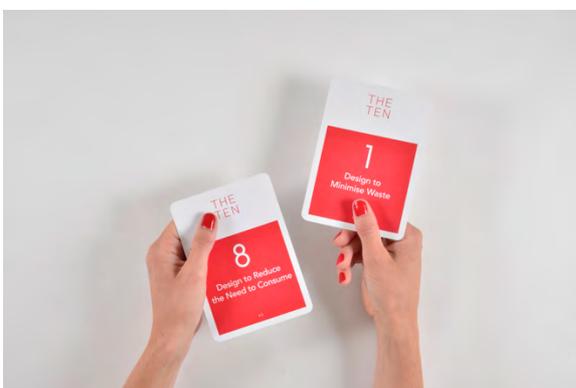


Figure 16: Hand 7 plays strategies 1 and 8

Figure 16. Strategies 1 and 8: Industry manifests an aim to achieve long life of materials either through technological innovation or durable design.

Figure 17. Strategies 2 and 9: Upcycling in industry is often connected to systems and services. Upcycling products is mostly achieved in connection with stores or business models for long life. Material approaches for upcycling are mostly connected to new technologies or craft.



Figure 17: Hand 3 plays strategies 2 and 9



Figure 18: Hand 8 plays strategies 3 and 4

Figure 18. Strategies 3 and 4: More than any other strategy, both are strongly dependent on material selection.

Figure 19. Strategies 5 and 8: User knowledge and communication are a key strategy for the future, as tagging, wearable tech and social media are increasingly influential on the way garments are purchased.



Figure 19: Hand 9 plays strategies 5 and 8



Figure 20: Hand 10 plays strategies 8 and 9

Figure 20. Strategies 9 and 8: Systems and services are characterised by long life approaches for maintaining products in circulation for longer, either through repair or testing of new business models.

4.1.2 Design Education: Sustainability Knowledge and Mindsets

The MISTRA research undertaken by the team of TED designers, researchers and teachers at UAL and Konstfack from 2011 to 2014, developed new educational models for exploring sustainability as a driver for design innovation and social change. Students were asked to consider their personal practice through the lens of TED's TEN sustainable strategies and to generate prototypes as practical models.

It is universally understood in education that the global fashion industry, supported by intensive textile production, is part of the present demand and ever increasing provision of consumer goods. It is also widely recognised that mass consumption has led to high levels of pollution and waste, water and pesticide misuse, environmental decay and landfill. The ecological and social problems are well known, as are the complex demands of manufacturing and the retail supply chain. Fashion companies need to accumulate cultural credibility as positive agencies in social change. Industry has become philosophical as well as political. Legislation in Europe will soon transform the business rhetoric of 'sustainable production' into end-of-life action. Recycling, recyclability, closed loops and open source are now part of the common language of students of design in schools, colleges and universities throughout Europe.

The astonishing sophistication of textile fabrics and the promise of extraordinary technological innovation in manufacture still needs to be developed by designers with aesthetic imagination and technical skills, which the best education continues to provide. However, the role of the designer is widening to involve considerable enhanced interaction with the retail environment, with the consumer and the after-life of products, as well as maximizing business and the "bottom line". The pressure to make sustainability a priority in both material and social culture is challenging design education intensely. The impacts of fabrics, washing, care, length of life and post-consumer destinations are now part of design imperatives.

What was once of little significance is now open to scrutiny and is firmly part of the designer's job description. Design education in textiles is, therefore, under transformation at all levels. Research into the ecological, material and human costs of

the fashion system began in earnest in higher education in the 1990s, when environmental impacts became a subject of educational discourse in the early years of the development of research in art and design. Now, the welfare of the individual, the family and community are increasingly influential in assessing good or bad practice in industry.

Today there is a self-evident necessity for undergraduate students to understand the role of design to address the wider implications of sustainability. A liberal arts education introduces a wide palette of subject matter to influence design. Technical and workshop skills are developed in studio conditions through a problem solving method of enquiry, with 'learning by doing' as an essential strategy. Current and past practice and literature are reviewed in accompanying theoretical programmes. In enlightened institutions in Sweden and the UK, key themes such as designing out waste or innovation in prototype experimentation are addressed directly or introduced as a constituent part of every project. Case studies from nature and culture introduce positive examples of sustainable systems. Raising the aesthetic and social value of materials through design has a positive effect on societal change towards sustainability. From natural systems, to craft traditions or the latest technology, the criteria still apply. Educational projects in the best institutions emphasise the issues of recycling, use of mono-materials and technical fibre recovery, which include analysis of the latest technological developments.

At postgraduate level, MA and research degrees, students look in detail at issues in the wider world from a more personal viewpoint. The study of material, cultural and humanitarian subject terrains of benefit to society, are invariably connected with sustainability. Contact experience with industry in both theoretical and practical contexts becomes important to MA students and an institutional research environment must now encourage enquiry, listening and reflection, accompanied by flexibility of thought and action. Design methodology will ideally include experimental testing and rigorous questioning with a refusal of cliché and formulaic solutions. Group activity is now an important element in preparation for future employment in design teams. The importance of communication is, without doubt, central to the education of the emerging textile designer. The transmission of ideas as text, image and object – by voice, projection, written text, exhibition and online, is acknowledged to be an essential set of skills to be developed by institutions educating new designers.

4.1.2.1 TED UAL Pilot: 'Reading & Practice Group' 2011

The MA Textiles Course based at Chelsea, UAL, attracts a broad international application, with a variety of disciplines as a first degree. The Course requires a portfolio of work and an MA project proposal from applicants for the one (calendar) year course to 'explore creative approaches to sustainable textiles and surface design'.

It is a studio-based, practice-led course, situated in a three-college Postgraduate School (CCW), which includes on campus, Textile Design, Fine Art, Graphic Communication and Interior Spatial Design. A short course was designed and delivered (2011-12) by TED as a 'pilot project' to test content and methods, before offering KF students 'Elective' short courses for the subsequent two years (2013 & 2014).

CCW 'Reading & Practice Group' (2011 - 2012) (Figure 21)

At UAL, a year cohort of approximately 38 MA Textile Design students worked in partnership as research teams, to test the efficacy of a course designed to increase sustainable design thinking. The TEN strategies were offered as weekly topics for research and discussion in a 'Reading and Practice Group' (table 11). Each team selected and researched a 'lead' TED strategy, most relevant to their personal projects, with the aim of transforming their practice using sustainability as a spur to design innovation. A visual presentation of their findings was made to the whole cohort. Each event was led by an expert in the field, able to critique the group presentation and to conduct studio tutorials in relation to individual project development. Students were encouraged to consider in their project as many of the ten strategies as possible. The results were encouraging in the scope and ambition for the innovation in sustainability and the collaboration established by groups in their working methods. Students benefitted from the research culture at the college and, undoubtedly, from the TED group of PhD students and researchers able to discuss informally their research questions, methodologies, references and influences.



Figure 21: Workshop session, Chelsea College of Arts (2011)

	TASKS	METHODS
Gathering Information	<ul style="list-style-type: none"> To understand principles of sustainability in designing textiles MA Courses To develop student thinking on sustainability without commercial constraints. To dissect the nature and basis for a personal or collaborative project. To examine contemporary society in a variety of cultures to reveal context for sustainable design. 	<ul style="list-style-type: none"> Expert Presentations Seminars: Ted's TEN strategies via illuminating examples. Literature & Practice Review Enable student teams to work collaboratively Case Study Research Tasks To use 'framing' devices to examine the context for sustainability.
Answering Question	<ul style="list-style-type: none"> To enable students to propose individual & group prototypes as more sustainable design approaches using TED TEN methodology. To gather information built up through student collaborative presentations as a guide to course structures 	<ul style="list-style-type: none"> Observation Workshops for students to select as many of TEN strategies as appropriate to evolve personal practice. Student groups to upload onto a database template from their research findings as an ongoing interactive resource.
Analysis/ Reflection	<ul style="list-style-type: none"> To identify barriers and opportunities to achieving sustainable solutions. To employ TEN strategies to overcome them. 	<ul style="list-style-type: none"> Student design presentations & expert critique of theory & practice by individuals & groups.
Sharing/ Next Steps	<ul style="list-style-type: none"> To revise student design prototypes produced to embody their learning. To refine course structure & content for international publication. To propose a course shaped by the findings of the 14 sessions on sustainable design. 	<ul style="list-style-type: none"> Group collaboration Questionnaire to gather student feedback Exhibition of prototypes with student critical evaluation texts, to amplify contextual thinking. A reflection report on the CCW student experience and feedback as a platform for developing and delivering an Elective in Konstfack, Sw. Blog

Table 12: CCW 'Reading & Practice Group' (2011 - 2012)

4.1.2.2 Konstfack University: TED Electives 2012 & 2013

Konstfack (UC) MA: Textiles in the Expanded Field comprises a student cohort of about 12 students per year on a two-year programme. It is situated within the largest University College of Arts Crafts and Design in Sweden, including Masters Degrees in Fine Art, Spatial Design, Textiles and Visual Communication.

The TED short-course was offered as a five-week Elective to students across all specialist subjects during their first year. They could incorporate and build upon these ideas in their final year of study. Konstfack students, as at Chelsea, apply to specialist MA courses, where they are expected to work independently at an advanced level, but with some research activity, theory and seminars in common with other Masters students. The MA enables students to explore materials, techniques and strategies in their personal specialisms and the cross-discipline Elective courses encourage diversity within individual projects. The Konstfack MA course is not specifically dedicated to sustainability in design, but the students are already very well informed, open to new ideas and curious about its potential to affect their thinking. TED researchers were given the opportunity to work in depth with individuals exploring the relationship between theory and practice.

Exploratory workshops in creative writing were held to enable students to identify new themes in their work and towards the development of a new expressive voice, better able to articulate their poetic imagination. Creative writing became a dynamic tool for documenting process and for discussing practice intuitively. Theory and practice were shown to be intimately connected. The students' research was also revealed as a process of self-examination, asking "what does it mean to make things?" and "what does it mean for me to make things?" (Figure 22)



Figure 22: Elective introduction meeting, design outcome, student design presentation



Figure 23: Konstfack studio, Black Hack workshop at Konstfack

Students were encouraged to evolve a personal Manifesto to identify the core of their practice by revealing the inner motives of its direction. ‘Zines’ were produced at the end of the course to publish the Manifestos as an outcome of the project. Other outcomes, through making, also explored ideas of emotional durability, material journeys, consumer motives, taste, fashion and ethical considerations (e.g. Black Hack workshop, figure 23).



Figure 24: Hand 11



Figure 25: Clockwise from top left:

Hand 11 (figure 24) revealed that students played a lead strategy 10 with strategies 2 and 9. Hands 12-15 (figure 25) show lead strategy with connected strategies from Konstfack students Matilda Dominique (2013), Lisa Axelsson (2013), Frida Aberg (2014) and Martina Skender (2014).

	TASKS	METHODS
Gathering Information	<ul style="list-style-type: none"> To examine contemporary society in a variety of cultures to reveal context for sustainable design. To develop student thinking on sustainability without commercial constraints. To gather information built up through student collaborative presentations as a guide to course structures. 	<ul style="list-style-type: none"> Literature & Practice Review Case Study Research Tasks To use 'framing' devices to examine the context for sustainability. Observation Student groups upload information from their research findings onto a database template as an ongoing interactive resource.
Answering Question	<ul style="list-style-type: none"> To apply & test principles of sustainability in designing textiles MA Courses To enable students to apply sustainability principles to existing textile practices. To dissect the nature of basis for a personal or collaborative project. To enable students to propose individual prototypes as more sustainable design approaches using TED TEN methodology. 	<ul style="list-style-type: none"> Workshops for students to select as many of TEN strategies as appropriate to evolve personal practice. Expert Presentations & Seminars: Ted's TEN strategies via illuminating examples. To use creative writing as a dynamic tool for documenting process and for discussing practice intuitively. To evolve a personal Manifesto to identify the core of student practice.
Analysis/ Reflection	<ul style="list-style-type: none"> To identify barriers and opportunities to achieving sustainable solutions. To employ TEN strategies to overcome them. 	<ul style="list-style-type: none"> To reflect on student design presentations. Expert critique of theory & practice by individuals & groups.
Sharing/ Next Steps	<ul style="list-style-type: none"> To enable student revised design prototypes produced to embody their learning. To refine course structure & content for international publication. To propose a course on sustainable design, shaped by the findings of the Elective 	<ul style="list-style-type: none"> Collaboration with student group. Questionnaire to gather student feedback Exhibition of prototypes with student critical evaluation texts, to amplify contextual thinking. Reflection report on the CCW student experience and feedback as a platform for developing and delivering an Elective at MA level. Blog

Table 13: Konstfack University: TED Electives 2012 & 2013

4.1.3 design decision making in fashion companies

Research early on in the process reinforced the team's belief that before the workshop tools could be used by the participants to work towards new design decisions, a level of knowledge, insight, understanding, responsibility and enthusiasm would need to be cultivated. As Piliavin et al (1969) argue, an element of "diffusion of responsibility" is often found in large companies, where departmental parameters create attitudes that restrict the individuals' urge to take action. In short, if a CSR department exists elsewhere in the company, design staff may view it as the CSR department's role to make sustainability decisions. In light of this, the team was in favour of creating a course that would inspire and educate, and also provide the means to make informed design decisions. As experienced educators we already knew that there was a great difference in working with emerging designers and working with designers in large companies. We were interested in finding out exactly *how* their decision making process differed, so that we could better understand how to design and tailor information when working in these different contexts. The report presents the actual redesign concepts in section 4.2.1. Here we review the thinking and decision-making.

Designers need to understand the complex landscape before making appropriate, informed design decisions.

Earley had been working with SFA since 2010, delivering sustainable design education workshops as part of the Forum for Education and Training, designing and delivering the 'Achieving Better Social & Environmental Performance Through Design' module. H&M stakeholders had been part of these sessions and had witnessed Earley present The TEN when it was first devised. During one of the workshops Johan Ward and Henrik Lampa had worked in a team to design a pair of digitally printed, reversible jeans. It was this prior experience that led to Earley and the team being invited to join the consortium bid in December 2010.

We discussed in early Mistra project meetings with H&M that only strategies 1 to 5 were considered to be relevant for the workshops with the New Development team. These were seen by H&M to be where the most appropriate design-making decisions took place. Interestingly, conversations taking place at the same time at SFA revealed that the smaller companies found considering the full range of strategies (1-10) to be inspiring and useful, but with a different sequence, as suggested by director Mike Schragger, which included: strategies 3 to 5 being worked through first (chemicals, water, energy, technology); followed by 1 and 2 (designing to reduce waste and for cyclability); before moving on to the more conceptual and systemic 'inter-departmental' design approaches such as 6, 8, 9 and 10. (Figure 26)



Figure 26: Left, TED Coding for H&M talks: Hand 18 with lead strategies 1-5 followed by 6-10; Right, Hand 17 with strategies 3-5, 1-2, and then 6-10, for the SFA workshops (2011-2014)

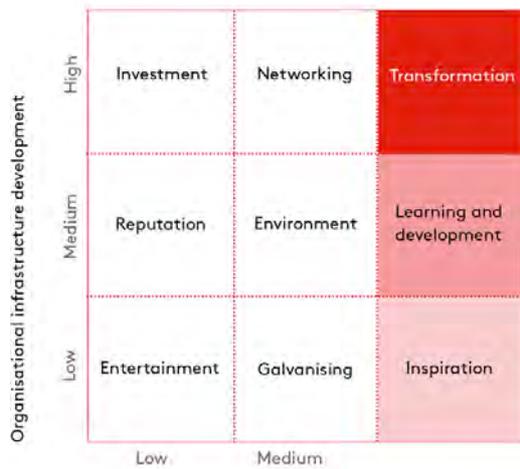
4.1.3.1 Sustainable Design Inspiration (SDI) Programme at H&M

At H&M the design teams had less control over the whole range of design decisions being made than in smaller companies. Based in the Buying Office (BO) in Stockholm, 4,900 miles away from the Production Office (PO) in Asia who make decisions around many aspects - factories for example - the Stockholm-based staff were limited in the way that they could interact with the holistic range of TEN concepts on offer.

The BO staff all had specific roles within a specific framework, with very tight deadlines and targets to adhere to. Early planning meetings involved reviewing the infrastructure, as little by little, information was given over to the TED team. To complicate things further, the stakeholders at the table changed regularly too, as key H&M staff moved in and out of the project planning team.

At first the TED team were brought in under the auspices of working with the education programme leaders, those that steered and delivered the internal training modules to staff. As the discussions progressed the H&M stakeholders decided that the way that TED worked, (with the scope and breadth of The TEN) being less structured, formalised, and prescriptive than say the materials, fabrics and fibres educational programme they ran (a compulsory two-hour module for all staff), would lend itself better to an 'inspirational' programme of talks and workshops (similarly to how trends would be delivered in-house). This decision made by H&M transformed the TED programme from being an 'education and training' module to a 'design inspiration' pilot course, leading to a more streamlined internal training programme at a later stage.

Schiuma (2011) argues in his book 'The Value of Arts for Business' that within the four value zones of the arts, one impact a design researcher can have in a big company is to provide inspiration, leading to learning and development. Ideally the company would look to use this insight to result in organisational, infrastructural and people / personnel transformation. Within the broader context of the project - and the timeframe, resources, range of deliverables and partnerships - this seemed like a realistic place to position the P3 team. (Figure 27)



Organizational people change/development

Figure 27: Inspiration, leading to learning & development, ultimately resulting in transformation of the organisational infrastructure

Designing the SDI Programme

The workshop structure was developed to follow an adapted Decision Making Diamond (Idenk) that included the stages of: conducting a pre-survey to gauge participants' knowledge levels; Framing the question; Exploring options creatively; Evaluating and agreeing on outcomes; Implementing; and the post-survey to gauge participants' new knowledge. (Figure 28)



Figure 28: H&M workshop model - Adapted from Idenk's Decision Making Diamond (Earley, 2013)

Over an 18-month period of visual presentations, written proposals and discussions, the concept of the T-shaped inspiration programme emerged: a one-hour inspirational lecture to be presented by Earley six times to reach as many of the BO staff as possible; and a 'deep-dive' workshop format consisting of three four-hour sessions that would take 30 New Development team staff through a detailed product redesign programme. This became known as the 'Sustainable Design Inspiration' (SDI) programme.

TED's The TEN was used to landscape the terrain of sustainability for fashion and textiles within a high volume context using current and future industry case studies that would be used for both the lecture and the workshops.

The H&M Lecture

In the planning stage we identified the need to use The TEN to landscape sustainable fashion in the international, high-volume context. We did this with a review of current case studies, which were edited by H&M team members, to tailor the information to suit the lecture audience. We referred to their 7 Conscious Commitments (7CC's) (figure 29) and adapted The TEN by clustering the strategies around the 7CC's, changing the wording to direct the statements more at design decisions. Figure 30 shows the postcard image developed and the change of wording.

The postcards were given out at the end of the lecture to encourage direct communications between the company staff and with the TED team. The lecture included 'Thinking Together' worksheets and breaks, which asked the audience to divide into small groups and apply the strategies to a product and project they were currently working on. (Figures 31 and 32)

At the end of each lecture – one hour given six times over a three-month period – many of the audience came up to Earley and the team, asking more about certain case studies (figure 33). This varied with each occasion, but in general designers from different divisions asked for information tailored specifically for them. How could we help them as print designers? Were there guidelines for designing prints in a more sustainable way? The slides were held with the White Room research team and those with questions were directed there to find out more.

Anecdotally we were told that this didn't necessarily work well. Some participants were told to come back later when they – the White Room team – weren't so busy. It highlighted to the researchers the need for the plan to be transparently in place for inspiration to lead to training and development, as per Schiuma (2011).



Figure 29: H&M's 7 Conscious Commitments



Figure 30: The TEN strategies overlaid



Figure 31: The 'Thinking Together' worksheets, ready for Professor Becky Earley's 'Sustainable Design Inspiration' H&M Lecture sessions, March – June 2013



Figure 32: A 'Thinking Together' moment in the lecture, June 2013



Figure 33: Energised exchanges after the lecture, June 2013

Workshop 1: Framing the Questions

In this introduction to the course, we explained the course and also showed some of the pre-survey results. As a warm up exercise we looked at the H&M garments brought in by participants from their own wardrobes. As they presented these to the group, highlighting why these were 'well worn' or 'unworn', the facilitators mapped these reasons onto a lifecycle map.

Next we introduced participants to the TED RED Toolbox. The group worked in five teams for this exercise. Each team was given case studies relating to one of 'THE TEN' strategies and was asked to review and code the cards based on now/near/far potential for their department. Each group then presented back to the room the contents of their strategy, giving examples from each of the now/near/far case studies reviewed. (The data set for this task can be found in the Resources section of the Textile Toolbox website).

Each group was asked to one of the 'now' ideas and apply it to one of the garments that was brought along to the workshop – the aim was to improve an 'unworn' garment in some way. There was little time for this task as we had overrun, but discussions took place around which of The Now Wall ideas could be used immediately, and which ideas the White Room staff were already working on introducing within the company.

The homework task was then discussed. Each participant was asked to try to use any one card in his or her job during the following month. They also took a blank case study card from the Toolbox, and was asked to research at least one new case study to add to the Toolbox, (any strategy / any timeframe).

Workshop 2: Exploring Options Creatively

After a brief recap about what happened in workshop 1, presented through slides and photos from that session, a show and tell took place with the new case studies brought in by the group from their homework task. Then these were added to the Now Wall which had been reinstalled in a new room by the facilitators. We then heard back about how the participants got on when they tried to use something from the Now Wall. The session was noticeably poorly attended – only a third of participants showed up. The group explained that a particular deadline had prevented the others coming. Only two participants had done the homework task, and presented their research, and added the cards to the wall.

Next followed a facilitated mapping exercise with the full range of design decisions where the team feel they have direct (or indirect) influence and decision-making power. We mapped the barriers and limitations that the individuals experienced, and brainstormed creative solutions to these barriers. The task ended with the participants writing a postcard to someone at H&M that they want to help them make a positive change.

The H&M barriers and opportunities work sheet in the workshop 2 led to the ideas and observations presented in Table 13.

The group then divided into teams and then took one of garments brought to the session, and placed it in the middle of the redesign sheet, and used two of the Now Wall strategy cards to quickly generate a redesign concept. After a while they were asked to go to the wall and take another one or two cases to add into the thinking. The groups then presented back their concepts. This session ended up being very fruitful for those that came along. The smaller numbers meant that the tasks and discussion were more productive.

H&M Barriers	Creative H&M Solutions
<p>Time: Deadlines are tight and workloads are heavy</p>	<p>Reinvent Creative Friday:</p> <ul style="list-style-type: none"> • Give it incentives • Encourage staff to know their 'alpha mood' and plan to have creative time then • Factor in how the benefits and ideas from these sessions get shared (real time and digital experiences?) • Support the staff's personal values within the company – food, paper/stationary, energy saving, work/life balance, travel, etc. • Broaden the opportunities for experimentation
<p>Price: H&M are 'in a rut' with the pressure of competing for lowest market prices</p>	<p>Investigate price brackets for the Conscious Collection:</p> <ul style="list-style-type: none"> • Demonstrate the demand for sustainable fashion, and the price points the consumers will pay • Offer incentives to consumers who buy from the Conscious Collection • Investigate the emerging youth generation who might become the 'good fashionistas' • Show the investment in R&D towards sustainability
<p>Sourcing: Problems trusting the certifiers</p>	<p>Total Transparency:</p> <ul style="list-style-type: none"> • Show the consumer the sources, processes, and costs incurred • Show what their choices mean
<p>Knowledge: Lack of dissemination of knowledge around best practice – examples happening externally</p>	<ul style="list-style-type: none"> • Create easy to use, constantly updated resources, that use digital technology (like an app) • Form an internal sustainable fashion focus group, to meet once a month to discuss ideas and offer support to each other across departments
<p>Knowledge: Lack of dissemination of knowledge around best practice at H&M</p>	<ul style="list-style-type: none"> • Create easy to use, constantly updated resources, that use digital technology (like an app for H&M staff) • Opportunities to showcase success stories internally. Can link with the above
<p>Size of company: co-ordination and communication problems</p>	<p>No specific ideas generated here, but a recurrent theme throughout the discussion.</p>
<p>Size of company: conflicting vision/ competing targets (sales, sustainability) / mixed messages</p>	<ul style="list-style-type: none"> • Review and then promote the benefits of scale of H&M, in terms of sustainability. 'Use our scale as a force for good' • Targets work. Set more in terms of sustainable fashion design
<p>Press: back lash or accusations of 'green washing'</p>	<ul style="list-style-type: none"> • Designers to be involved in innovative marketing and messaging. • What works for them with other brands and products? • What encourages them to be better consumers? • How would they like H&M's image to look?

Table 14: H&M barriers and creative solutions

Task for the month: There was no homework for this session. Instead of setting any homework, a discussion took place after the workshop between the researchers and the H&M managers, to reflect on the reason staff had failed to attend. As so few participants turned up to the second workshop, it was decided as an emergency measure that a recap session should be run to keep the momentum in the process going.

Workshop 2b: A Lunchtime Recap Session

This one-hour intense workshop presented the findings to date and asked the designers to use redesign sheets to rethink garments from the rail in the room. This session had a real energy about it – and gave us the insight that longer half-day workshops (common elsewhere in industry) might not be the best format for fashion designers in a large company like H&M. Redesign concepts were generated at this recap, and participants seemed enthused about continuing with the pilot course.

Workshop 3: Evaluating, Agreeing & Presenting

We began with a quick review of the concepts and ideas generated during the last 3 workshops. Then we had presentations by teams of three or four, of garments brought to the workshop and one H&M team member completed a simple scorecard derived by the TED researchers from the Higg index tool (see p.80). Teams were then asked to redesign the garment, using the scorecard as a prompt and referring to the cases on the Now Wall when required, and to aim to create a higher ‘improvement’ score than during the original presentation. Three of these redesign concepts are presented in this report, in section 4.2.1.1.

4.1.3.2The SFA Workshops

The SFA course differed from the H&M SDI course, in that it was not solely about inspiration. Infact it was primarily an educational course training companies in a range of sustainable strategies. The SFA courses offered one-day experiences in marketing, design, sourcing and communication. In this sense, if we look at the Schiuma (figure 27) graphic, we could expect the researchers’ work here to have a greater impact and change effect.

Earley had first worked at SFA in 2009, delivering the design component of the course, using 7 design strategies, which then evolved into The TEN in 2010. The participants received a one-day training, which was a landscape review of the field, using slide talks by Earley. This was interjected by redesign tasks, with the result that at the end of the day, each group – in total around 30 people – had worked through each strategy and applied the thinking to a product brought to the session by one of the companies present.

SFA Programme & Research Methods

In 2011 when the Mistra project started, the researchers began to work on a ‘Deep Dive in Sustainable Design’ for the SFA course, which offered a refined set of case studies which were more industry- and less craft- focused, and which presented the strategies in a new order – 3,4,5 first, then back to 1,2, and finally 5-10. (Figure 34)

This 'coding' presented the information in a prioritised way which was more appropriate to this audience. Namely, that materials, processes and technology were the most actionable changes that could be made, followed by reducing waste and recycling products; and then the more social and service strategies, which were often where participants linked ideas with others from their company; sometimes a CSR representative was present, or someone from marketing or even HR. Most workshops took place in Stockholm with the exception of the NICE/SFA event in Copenhagen, September 2011.

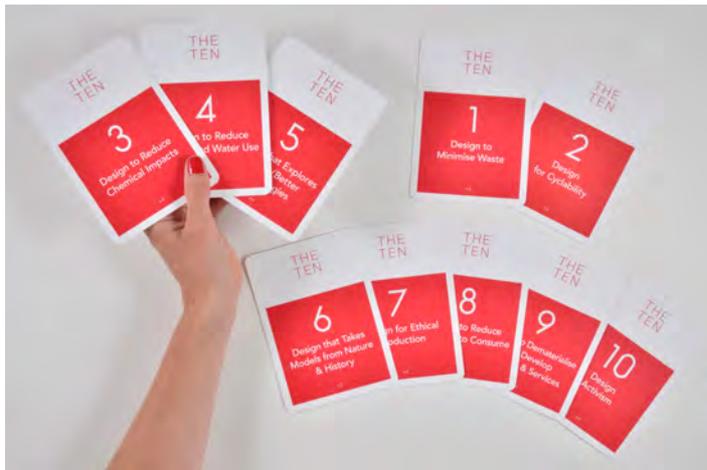


Figure 34: Hand 17 with strategies 3-5, 1-2, and then 6-10, for the SFA workshops (2011-2014)

The team roles for the work at SFA were similar to H&M, but with fewer co-facilitators. Mike Schragger from SFA led on their behalf in the discussions around the editing of content, whilst Andreas Foller gave feedback on the design and delivery of the workshops, and communicated with the participants via email in the run up to the day. Earley led the researchers in the development of case studies, slides and worksheets. She designed the day in terms of timings and delivery themes. She was the lead facilitator in Stockholm, and was assisted by the PhD researcher Clara Vuletich on most occasions. Vuletich developed a warm up exercise for the day, which used green 'question cards' to support conversations around the participants understanding of approaches, attitudes and behaviours in the context of sustainability at home and at work.

Workshop Results

A selection of the redesign concepts were reviewed in section 4.2.1, but in general every one-day workshop resulted in a strong range of positive feedback from participants. 27 redesign concepts were created during the project period, with the last two workshops – where the Higg Index was used to score and then rescore – being the clearest in terms of measurable improvements created through design thinking.

In late 2012, one of the negotiation presentations at H&M had included a proposal by researchers Earley and Vuletich around how the Higg Index could be married with the TEN in redesign tasks and worksheets. In the end H&M had felt that it would be too complicated for the SDI programme, but Earley, Vuletich and Mike Schragger were interested in introducing it in the SFA workshop format. The workshops in May 2013 and November 2014 used a two-day format, with Foller at SFA conducting a pre score

of the participants chosen garment. This pre-score was based on a questionnaire co-designed by Foller, Earley and Vuletich, which asked the participants to list in detail as many aspects of the product as possible – material, finish, colour, cut, labeling, etc.

The first one-day workshop then began with a garment that had already been ‘understood’ and rated by the participants. In the course of the day they worked their way through the TED redesign sheet, adding in new or changing existing design decisions. By the end of the day the redesigned product was ready to be rescored. The second day involved the participants learning how to score a product by accessing the Higg Tool themselves, and thus gaining their new product score.

Scores varied from a 1% improvement to a huge 41% improvement, with all the highest percentage improvements occurring in the second version of the workshop, in November 2014. (Table 14)

	Typology	Pre Score	Post Score	% Improvement
Brand 1*	T-Shirt, cotton	55	61	6%
Brand 2*	Sweater, cotton	52	53	1%
Brand 3*	Top, polyester elastane	47	64	17%
Brand 4*	Trousers, cotton/spandex	34	52	18%
Brand 5*	Trousers, cotton/spandex	47	51	4%
Brand 6*	Trousers, cotton/spandex	50	59	9%
Brand 7*	Childs dress, cotton spandex	45	57	12%
Brand 8*	Jacket, polyester/nylon	55	65	10%
Brand 9*	Jacket, polyester/cotton	32	48	26%
Brand 10*	Sleeping bag, polyamide down	37	51	14%
Brand 11**	Hoodie	38	78	40%
Brand 12**	Outdoor Jacket	42	69	27%
Brand 13**	Blouse	54	78	24%
Brand 14**	T-Shirt	36	77	41%

*Table 15: Improved Higg Index scores – results of the SFA workshops (*May 2013 Workshop; **November 2014 workshop)*

Further analysis of these redesign concepts has still to be conducted, but the main improvements were made by making the products: from fibres with lower chemical, water and energy impacts; monomaterial; and devoid of harmful finishing chemicals. In a few cases, product care and repair services being designed in also had a positive effect on the profile. Scores were improved most often through considerations around end-of-life: products were linked to a recycling scheme; clearly labelled with washing / laundry instructions; and options for reuse were given to the user by the brand or instructions for peer-to-peer exchanges were provided.

Whilst the results of the redesign workshop using The TEN are promising, the realities of implementing the ideas and then testing for losses in performance or changes in aesthetic appeal may still present the brand with the biggest of all challenges. It was not that difficult to improve the product through design thinking, but how would the

workshop participant communicate these ideas back at base, and gain the support of the managers in making the required changes? That has of course been the challenge for sustainable design innovation for some time, at least now workshop participants can talk in scores and not just concepts. If brand 4 in the experiment had been H&M (it was), and their highest volume best selling product was a pair of black cotton/spandex jeans (it is), and that product scored 18% better with a rethink and the widely respected Higg Index tool, the redesigned product could lead to quite significant global environmental improvement.

4.1.3.3 Key Insights from the P3 Workshops Programmes at Konstfack, H&M & SFA

Designers in companies of all scales need to get involved in the sustainability decisions, it's no longer solely the domain of the CSR department. The age-old adage of information being understood through action rather than merely listening, or being talked to, of course applies here.

Design research educators need to tailor information for specific stakeholders, helping them to identify how far from market innovation they might be.

The MISTRA research undertaken by the team of TED designers, researchers and teachers at UAL and Konstfack from 2011 to 2014, developed new educational models for exploring sustainability as a driver for design innovation and social change. Students were asked to consider their personal practice through the lens of TED's TEN sustainable strategies and to generate prototypes and practical models. The objective of the course was to encourage innovative ways of thinking about the design of fabrics and garments based on sustainability values within a broad, interconnected view of design. The outcomes of TED research are intended to provide insights and operational models for an MA curriculum, which better equips students for careers in design. The student groups from both institutions were open, curious and well educated with a wide variety of individual ambitions and an enthusiasm for 'learning through making'. Both institutions encouraged a spirit of enquiry, a transforming philosophy, value systems and relevant design strategies. Making a manifesto – an unusual task for a textile student – enables them to consolidate their personal and professional values, beliefs and ambitions.

Manifesto making is an essential part of understanding what is needed when individuals work collaboratively towards systemic change.

The bigger the company that designers work in, the fewer design decisions they make. More complex and distant chains of command create a barrier between designers and the final product, with less autonomy and ownership. We learned that tailoring The TEN and the information on offer was beneficial to the needs of the stakeholder.

H&M required information around strategies 1-5 only; the design decisions that can be actioned by the New Development team. A shared interest in cyclability emerged through the workshop process where participants were conducting redesign tasks. However, the talks (which were broader than strategies 1-5 in scope and attended by

upwards of 350 staff) elicited a strong response around fashion services; products having consecutive lives and bringing additional revenue back to the company.

Feedback overall revealed that the workshops were good for refreshing and reminding participants about the issues, with The TEN being a useful framework to explore new ideas, but these may not have reached the Buying Office staff. The 'time coding' of innovation for inspiration cases – reviewing cases that were usable **now** (up to 2 years), **near** (up to 5 years), or **far** (10 years or more) from market – helped the participants understand what to aim for in their current work, and what to work towards.

SFA and the SME brands were interested in all ten strategies but feedback revealed that focussing on one or two (usually chemical reduction (3) and cyclability (2)) gave them the most benefit from the workshops. Considering the other strategies could be more effective with other company departments, such as marketing. The emerging designers at Konstfack were mostly interested in Design Activism (10) and in general were able to relate almost all of the strategies to their project work and personal / professional manifestos.

Infrastructural barriers in large companies may prevent sustainable design concepts being more readily and quickly adopted.

The research highlighted the different design barriers and opportunities that each stakeholder faced, in particular the large corporation in comparison to the more agile SME entrepreneur. Reflecting on the work by TED at H&M, the researchers gained new insight around the barriers, from the particular perspectives of the designers working there.

From the TED team's perspective, the time spent at H&M has been a steep learning curve, as access to staff was not easy at times. The researchers were less able to work with the freedom they are used to, all decisions needed approval from several stakeholders. Likewise, there was a real sense that internal decision-making and insight was not shared with the team, in order to protect future investment and direction. The Ted researchers received feedback phrased in either very vague language or anecdotally over a cup of coffee, and were also actively discouraged from communicating too often with staff members as they were so busy. This was intended to protect the workshop participants from experiencing the SDI course as it was too time consuming, but it also had the effect of distancing the TED researchers from the experience of the participants, and enabling them to adapt more to the needs of the group.

Communication between the stakeholders is key. It is a design challenge in itself. The researchers are strong communicators, coming from an educational and practice background. Yet communicating in a large corporation needs a particular approach if the research is to happen in a way that satisfies both parties. The insights that the company and industry stakeholders gain are often held close to their chests, an unwillingness to share based on an understandable 'competition' mentality. The researchers were not formally told about how the research might influence the thoughts and ideas within the company. This could be due to a lack of management experience in the TED research team; on reflection these insights could have been pursued. It did, however, give rise to the understanding that new pathways and

collaborations are needed, for researchers to be embedded in companies, in partnership with business strategy professionals, to build more mutually beneficial research projects.

The team also experienced problems with attendance of participants, and without having direct access to the audience, found it difficult to address. Workloads and allocated research time for staff need to be reviewed so that these kinds of 'inspiration' projects can be effectively experienced. The possibility for more internal targets and incentives for sustainable design came up repeatedly as a way enabling staff to participate in a way that can be 'rated' as part of their personal profiles and annual achievements.

Textile Design Thinking can be used in large companies to make the process of sustainable change tangible to staff and potentially offer a greater understanding of the organisational barriers that inhibit progress

In a paper co-written by Earley and Andersen (2014) based on the SDI course at H&M, design thinking and the sociology of translation are fused together - particularly Callon's four moments of translation (1986) - creating an analytical framework to explore organisational barriers to change towards sustainability in the textile and fashion industry. Drawing on design thinking Earley & Andersen proposed a fifth moment to Callon's framework to highlight the value of iterations or "overlaps" (Callon, 1986) in processes of change. Based on an analysis and discussion of the SDI workshop series they argued that design thinking, especially through its use of design tools, has the potential to make the challenges and opportunities related to processes of sustainability change tangible and thus more actionable at individual and organisational level. They further argued that the framework established could facilitate a more nuanced understanding of organisational barriers to change towards sustainability and also bestow the field of design thinking with additional analytical concepts to explore its methods and communicate its potential value to processes of change.

Which sustainable design strategies do designers in fashion companies find most useful when redesigning and improving products?

4.2 New Design Models

This body of work responded to Aim 2: *Create new models for more sustainable alternatives for different design stakeholders.*

4.2.1 introduction to the redesign concepts

We used different tools to audit garments and to redesign concepts in the workshops. As an outcome, we generated 35 new sustainable garment concepts from the workshops at H&M and SFA. The redesign concepts span from long life to short life models. Some garment concepts linked to the MISTRA Future Fashion garment typologies were researched in project 2 of the consortium, while others were expanded into models for future fashion through the mentored exhibition commissions of the Textile Toolbox. Through the workshops, the redesign concepts in large industry such as H&M and in small and medium enterprises at SFA both considered the use phase and end-of-life of the garment, with strategies ranging from material selection to consumer involvement.

4.2.1.1 H&M

The work sheets we developed for H&M included reflections of The TEN strategies, the Higg Index and the H&M conscious commitments. The work sheets only focused on The TEN strategies 1-5. The redesign of the garment was achieved in three steps: 1 garment audit sheet, 1 garment redesign sheet and 1 garment checklist.

The garment scorecard at the end of the workshop rated the project against strategies 1-5 to develop a product TED code. The scorecard acted as a simplified version of the Higg Index evaluation at the SFA workshops. (Figure 35)

The final section on the scorecard included reflections on price point, aesthetic, performance and added value. The highest score for each reflection in the checklist was 5, building the sequence of lead and secondary strategies considered in each design.

Textiles Environment Design

Name of Prototype:

*Score:

1 Does your redesign minimise waste?

2 Can it be recycled or upcycled at its end of life?

3 Does it reduce chemical impacts in production and use?

4 Does it reduce energy & water in production and use?

5 Does it utilise clean / better technologies?

6 Does the redesign maintain the price point?

7 Does the redesign improve the overall aesthetic?

8 Does the redesign improve the garment's performance and function?

9 Have you considered added value - social, or consumer?

10 Write your own question:

** Score your design between 1 and 5 (with 1 being 'low' and 5 'high')*

Figure 35: Garment Score card

H&M - selected redesign workshop concepts that link to MISTRA Future Fashion garment typologies:

Redesign 24: The Family Jeans: A Pair of Denim Jeans to Last a Lifetime



Figure 36: Redesign concept 24

The redesigned pair of jeans includes ideas for simplifying the design and reinforcing the construction and material selection for a long wear and durable jeans (figure 36). These 'perfect jeans to last a life time' were developed as a 'classic pair of 5 pocket Jeans with perfect fit and great quality'. More sustainable materials were used in this redesign and it integrates ideas for patches and low wash to create a durable 'bond with your garment'. This long life concept fits with the garment typology of denim jeans explored in [project 2](#) of the MISTRA Future Fashion consortium.

The garment checklist scored the concept from 12 points to a new score of 29 points. The lead strategy considered was strategy 2 and scored 5 points after an initial 3 points. The redesign included new labels printed directly inside the pockets and low impact material considerations: biodegradable materials to bury at the end of life, organic and recycled cotton, recycled polyester thread and recycled labels. The strategies with the next highest scores were strategies 3 and 4. Lower energy and water use were scored 5 (previously 3) through considerations such as laser wash and non-indigo dyeing processes. A new score of 5 (previously 2) in chemical reduction was achieved through the exploration of enzyme coatings and darker patches on garment that makes it less likely to wash.

Redesign 19: The Polyester Dress: A Mono-material Dress for Upcycling



Figure 37: Redesign concept 19

The recycled polyester dress (figure 37) uses the latest recycling technology for mono material polyester in the final garment checklist. During its life cycle, possibilities for upcycling into other garments or an H&M service to repurpose it brings it back to a closed loop. This short life concept links to the *Seamsdress* (Goldsworthy 2014) and *Fast ReFashion* (Earley 2013) models of the Textile Toolbox exhibition.

The garment checklist scored 39 points after redesigning a garment that initially scored only 12 points. The lead strategy 2 scored 5 points (previously 4) with reflections of upcycling the garment into a top or mini dress, before chemically recycling the polyester. Chemical impacts in strategy 3 are considered in the use of a mono material (100% polyester), raising the score from 3 to 5. Two new strategies have been added to the redesign, such as minimising waste (strategy 1) with recycling considerations, and encouraging the use of better recycling technologies (strategy 5).

Redesign 20: The Wool Blazer: A Long Wear & Low Wash Garment



Figure 38: Redesign concept 20

Figure 38 - The wool garment is a long wear garment with low wash that uses recycled material and a design that will allow longevity and 'passing on': simple design changes such as adding a button make it more versatile; the material selection allows it to be stain-free for long wear; added cotton pads in arm holes can be removed for washing. This long life concept links to the *Library Jumper* (Harvey 2014) model of the Textile Toolbox exhibition.

The garment checklist redesign scored 18 points. The lead strategy for the garment is strategy 2 with the highest score of 4 points, followed by strategies 3 and 4 with 3 points.

Summary

All garments achieved a higher sustainability score in the redesign. Although the strategies explored in the H&M workshops only ranged from 1-5 in order to focus the garment audit on material selection and technologies for reduced impacts, the final redesigned garment concepts included ideas that support less washing in the use phase, as well as end-of-life strategies for upcycling through consumer involvement.

4.2.1.2SFA

The SFA workshop in June 2012 used a TED work sheet where garments were assessed against The TEN strategies 1-10. Workshop participants reflected on their 'personal TED code', making design improvements to garments brought into the session, and creating a range of key design strategies to focus on.

The SFA workshop in May 2013 used a worksheet similar to that used at H&M, based on The TEN strategies and Higg Index questions but with the difference that this workshop included questions on the full range of The TEN strategies, 1-10. Participants were able in this session to create a before and after garment score, giving them a percentage 'improvement by redesign'.

SFA - selected redesign workshop concepts that link to MISTRA Future Fashion garment typologies:

Redesign 7: The Cable Jumper: A Low Impact Jumper for Customisation



Figure 39: SFA May 2013 - Redesign concept 7

Figure 39 - The cable sweater connects strategies for local low impact manufacture (3) with strategies for ethics (7), services (9) and activism (10). It requires low wash (4) and has possibilities for mono materiality (1) with the reuse of the yarns (5) or the garment itself. Mending (8) and rental services are linked with transparency of the product through an online diary to help spread the word for customisation tactics.

This long life concept links to the Textile Toolbox *Library Jumper* model (Harvey 2014), where the designer explored how the aesthetic and tools for a library jumper would change.

Redesign 8: Racer Back Top: A Top for Activism and Upcycling



Figure 40: SFA May 2013 - Redesign concept 8

Figure 40 - This concept connects short life cyclability (2) with services for long life customisation (8) through online redesign tutorials (9) and the cooperation of design schools to redesign the garment (10). Fibre 2 fibre recycling, printed label information and minimal material reflections contribute to a garment prototype that considers most strategies in the redesign. This short life concept links to the Textile Toolbox models for *Seamsdress* and *Fast ReFashion*.

Redesign 9: The 'Mickam' Trousers: Jeans for Ethical Production



Figure 41: SFA May 2013 - Redesign concept 9

Figure 41 - This denim jeans redesign concept includes reflections on strategy 7 (Design for Ethical Production) with projects that reinvest in production countries such as Bangladesh. The design proposal considered communication to the consumer in all strategies including low wash (4), reuse (2), re-fashioning (9) and DIY (8). It also considers changes in companies through the collaboration with engineers (5) and the training of young designers. This long life concept links to the Textile Toolbox models for *Shanghai Shirt* (Earley & Dodd, 2014) and *Inner/Outer Jacket* (Vuletich 2014).

Redesign 2: The Sailor Shirt: Subscription Services for Short Life Shirts



Figure 42: SFA June 2012 - Redesign concept 2

Figure 42 - The lead strategy is 9, Design to Dematerialise and Develop Systems and Services. With ideas for leasing and postal services, the subscription to this fashion company reduces impacts and generates a loyal customer base. It proposes a 3-D knitted T-shirt replacement service, utilising local regeneration systems. Experimentation with new technologies for garment production (strategy 5) and for reduced chemical, water and energy use (strategies 3 & 4), is connected to minimising waste (1 & 8) and customisation (9).

The short life shirt concept connects systems and services ideas with the MISTRA Future Fashion T-shirt typology and with the *A.S.A.P Paper Cloth* model (Politowicz & Goldsworthy 2014) on the Textile Toolbox site.

Redesign 4: The 100-year Backpack: A Classic Outdoor Backpack for Activism

Figure 43 - The team used an archive piece (not pictured) for inspiration – a classic outdoor backpack made in canvas with leather straps. They wanted to understand how the contemporary version (pictured) could be given a long life through design.

The 100-year backpack responds to a challenge for long wear that links good design to activism. The lead strategy is 8, Design to Reduce the Need to Consume. Strategies for minimising waste (1) are connected to repair (8, 9) and activism (10) in the consideration of historic classics (6).

This long life concept links to other outdoor redesign concepts and to the MFF garment typology of a jacket for sports wear.

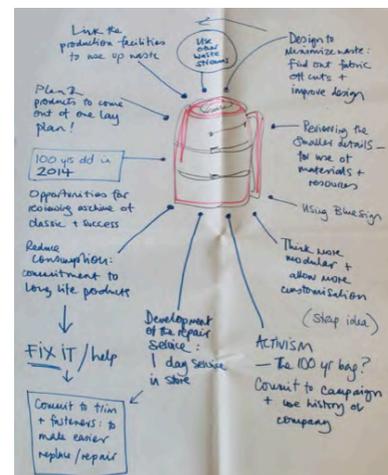


Figure 43: SFA June 2012 - Redesign concept 4

Redesign 6: The Long Life Jacket: Biomimicry Outdoor Wear



Figure 44: SFA June 2012 - Redesign concept 6

Figure 44 - This redesign concept responds to concepts for modularity through multifunctional features that extend the garment's life cycle. The lead strategy is 6, Models from Nature and it connects biomimicry strategies for colour change with activism that raises awareness of the environment (10). Working with zero waste pattern design (1) and modular features (2), the outdoor purpose of the garment includes reflections on material selection (3, 4) in connection to new technologies (5).

Conclusion

Designers in large companies largely reflect on Cyclability strategies (2) while SME's are more likely to include Activism (10) as a core principle. Most H&M redesign concepts considered strategy 2 (Design for Cyclability) as lead strategy, with reflections on Reducing Chemical Impacts (strategy 3) and Reducing Energy and Water Use (strategy 4) (Figure 45, left). SFA concepts included ideas for fashion services and activism as the workshop included reflection on strategies 6-10 (Figure 45, right).



Figure 45: Left, hand 21 considers lead strategies 2, 3 and 4 at H&M and right, hand 22 connects strategies 9 and 10 with 6, 7 and 8 at SFA

Garment typologies and connected strategies emerged from both H&M and SFA workshops:

- Durable jeans for long life: concept 24 & 25 at H&M; concept 9, 10 & 11 at SFA in May 2013.
- Sports wear and technical garments that are mono material and embrace new technologies for production and recycling: concept 22 & 23 at H&M; concept 8, 12 & 13 at SFA May 2013; concept 4 & 6 at SFA June 2012.
- Wool garments for low wash and long life with customisation opportunities: concept 20 & 21 at H&M; concept 7 at SFA May 2013.
- Fashion garments for short life with redesign and upcycling opportunities before being returned into a recycling loop: concept 19 H&M and concept 1 & 2 at SFA June 2012.



Figure 47: Hand 23 plays strategy 2 in large companies and strategy 10 in SME's

textile toolbox exhibition

pp.92–113

Which sustainable design strategies can be combined to create new models that signal systemic change?

4.2.2 new design concepts (practice-based research)

This body of work responded to Aim 2 of P3: *Create new models for more sustainable alternatives for different design stakeholders.*

Curatorial Approach

The data collected and experience gained through the lectures, workshops, and the online platform, was used to create a set of design briefs. Ten new 'design commissions' were created in response to these briefs and exhibited on an online web platform and touring showcase (Nov'14 – May '15).

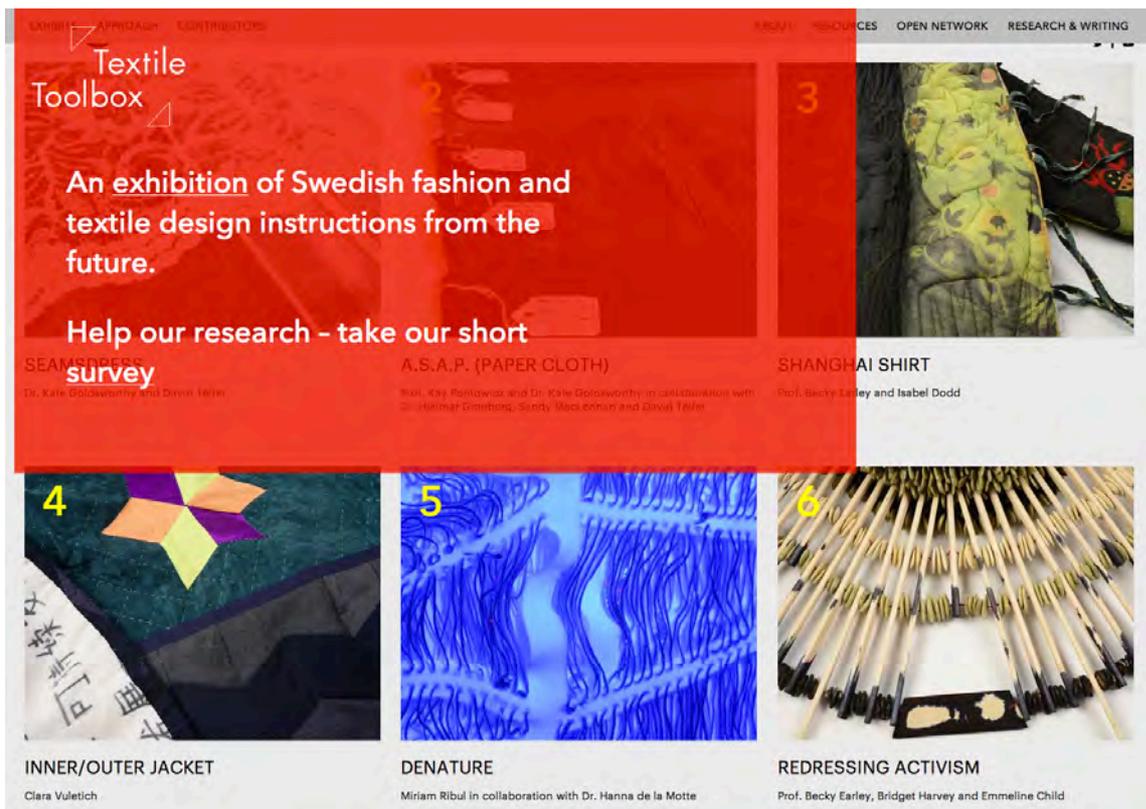


Figure 48: The Textile Toolbox online exhibition, www.textiletoolbox.com

The wide range of stakeholder and internal team discussions and workshops, brainstorming and landscaping tasks, led to identifying three thematic ways to interconnect The TEN design strategies, and create design briefs within each of these zones. These themes were explored through the researchers' making processes for the exhibition pieces. The web platform (figure 48) showcased the work with sketchbooks

and film interviews. This design items have been presented below within the three themes: Material Systems, Social Models and Shifting Mindsets.

In order to more clearly explain how the briefs were developed from stages 1 and 2, we will explain the way in which the 'TED Coding' concept worked, and the way in which the additional, strategic projects undertaken by the team contributed to the new insights around how to frame the potential for design to contribute to systemic change.

TED Coding

The Textile Toolbox exhibition showcases models for systemic change either through the collaboration with researchers in the consortium or through briefs that respond to their research outcomes. The aim was to achieve interconnected strategy outcomes in the evaluation of how design can impact other stakeholders in the fashion industry. The lead strategy of the design outcomes was based on either the context of the design research or on the designer's practice. For example, the connection to business models research led to increased models for strategies 8, 9 and 10, while the connection to technical scientists led to models for strategies 2 and 5.

Interdisciplinary Strategic Projects: TED in China and The COST Project

Four of the exhibits that were featured as part of the Textile Toolbox exhibition are the outcomes of project interactions that emerged outside of the MFF deliverables from collaborations between MISTRA Future Fashion researchers and other projects. These projects emerged as researchers initiated proposals to engage in the research of the other consortium partners and increase the collaboration between the research projects. The work was supported both through additional funding and through the collaborating MFF project partners. The design outcomes were included for showcase in the Textile Toolbox exhibition as each signposted a systemic model for design research in an interdisciplinary context. While the design outcomes were developed by the design researchers and not from a brief, for the online exhibition they were evaluated by the project team against the lead and secondary strategies these included.

In Phase 1, two projects were developed in collaboration with consortium partners that demonstrate the benefits and potential opportunities for collaboration and interdisciplinary practice in sustainable fashion research. The Projects also demonstrate the flexibility and value of using The TEN as a framework for discussion, and for finding new possibilities.

The first collaborative project was developed through MISTRA strategic funding and linked the research of P3 (Sustainable Design Processes) with P1 (Business Models). TED Researchers accompanied P1 PhD Researcher Kirsti Reitan Anderson to undertake field research in China and explore the adaption of The TEN in new cultural and industrial contexts. The other collaboration developed outside the MFF remit, was a project between P3 Research Assistant Miriam Ribul and MFF project leader Hanna de la Motte. This Project explored the potential role of design in closed-loop chemical recycling for regenerated cellulose. The project was funded externally by COST (European Cooperation in Science and Technology).

Working within a scientific research context, both projects led to an expanded skill set for the design researchers and a deeper understanding of the methods and approach of the social and material sciences.

TED in China



Figure 49: TED team and CBS researchers at The EcoChic Awards, Hong Kong Fashion Week, 2013.

This project was supported by a strategic funding bid developed by MISTRA PhD researcher Kirsti Reitan Andersen from P1/Copenhagen Business School. The project was titled 'TED in China' and was the conclusion to an 'Engaged Scholarship' programme in which Andersen studied and worked with TED to understand the textile design researchers as 'Cultural Intermediaries'. This proposal aimed to understand China as an important production country in the fashion industry, and to educate and inspire Chinese designers and stakeholders towards a more sustainable industry. Anderson and TED researchers, including P3 PhD Student Clara Vuletich and other UAL PhD researchers (figure 49) undertook fieldwork to China and the findings were then used to develop a TEN workshop with Chinese designers and stakeholders.

The TEN strategies were translated into mainland and simplified Chinese and used as a 'conversation starter' and workshop tool during the fieldwork. Other methods used during the fieldwork included interviews observation and drawing/photography, and garment analysis at museums and secondhand markets. Following the facilitation of TEN workshops with stakeholders, the TED researchers also collaborated on the creation of several artifacts for the Textile Toolbox exhibition including the Shanghai Shirt; Inner/Outer Jacket, and Redressing Activism.

The primary finding from the project was the identification of barriers that designers experience to effect positive change in the supply chain. Design decisions have environmental and social impacts in production countries such as China, yet the designer has little power or influence in making 'better' decisions. The fieldwork and

workshops also brought to light the focus on toxicity and pollution issues caused by the textile industry in China. TED strategy number 3, Design to Reduce Chemical Impacts, was shown to be the most important strategy for Chinese designers and stakeholders. Through the design of a new model in this context, the missing sustainable design strategies 1-4 are added back into the remote production context.

This project demonstrates the synergies between strategies 8, 9 and 10 in a business models research context.

The COST Project

Inspired by the workshop by MFF PhD researcher Anna Palme in Gothenburg in December 2012, Research Assistant Miriam Ribul developed a proposal to map the potential of closed-loop regenerated cellulose fibres through design. Here the design researcher developed their skillset within a scientific context whereas scientific partners benefitted from the design research through an expanded set of tools for the research.

The COST-funded project titled 'Design Possibilities for Regenerated Cellulose Materials' was written in collaboration with technical scientist Dr Hanna de la Motte. The design researcher was embedded as 'Designer-in-Residence' in the P5 research laboratories and, through the engagement in the scientific context, developed potential leads for further collaboration. The resulting design proposal and prototype was analysed using The TEN framework to identify potential design strategies, including Models from Nature (6), Developing New Systems (9), Reducing Consumption (8) and Activism (10).

This project extended the design researcher's ongoing enquiry into materials production through prototyping in a scientific context. The process was documented in a project report, and the design outcomes developed from the research were showcased in the Textile Toolbox exhibition. This project demonstrates the synergies between the strategies of Cyclability (2) with Technology (5) in a material science context.

Mentored Exhibits

Other exhibits were commissioned by the co-curators to add further insight to The TEN strategies, building a greater understanding of how these connect to the research in the consortium. The design briefs for these exhibits responded to key research insights from the consortium partners. The existing practice of the designers within the briefed context built the lead strategy card for the exhibition.

4.2.2.1 materials systems: design approaches towards systemic change and design for cyclability

This exhibition theme involves strategies for design that engage and extend current industry systems and economic models. By intervening in these existing paradigms, design can be used to improve, streamline and innovate with materials, products and processes.

Design for Cyclability (Goldsworthy, 2013) has been an emerging and expanding theme in the project and across the sector as a whole since the start of the research. Several concepts were developed around how best to incorporate circularity into the design process based on existing work by researchers and insights gained in the reviews and workshops.

Exhibits 1 (Seamsdress), 2 (ASAP) and 5 (DeNAture) represent this kind of thinking. They all address cyclability as a systemic design approach within materials and processing systems in the textile industry.

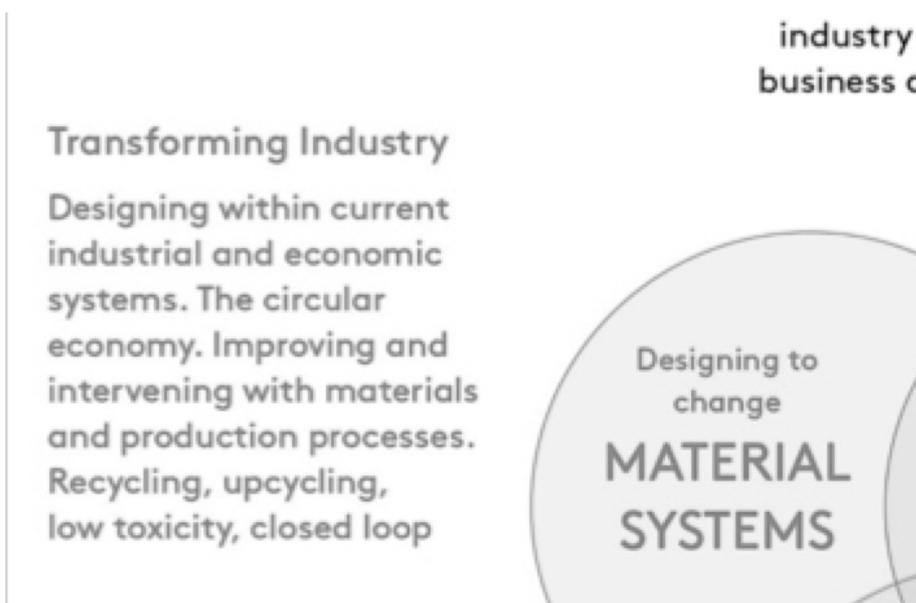


Exhibit 1 Seamsdress: Vertical laser production for monomaterial garments increases cyclability at end-of-life stage

Lead strategy 2, Kate Goldsworthy. Based on Dr. Kate Goldsworthy's research in Design for Cyclability (2) it is part of her body of work into laser line production models.



Figure 50: Above, Hand 32 shows Seamsdress lead card strategy 2, followed by strategies 1, 3, 4, 5, 6 and 9. Below, Seamsdress and Laser Line

Figure 50 - This model rethinks current manufacturing systems for ready-made and finished synthetic clothing including fashion, sportswear and corporate-wear apparel in particular. The aim is to enable the circular flow of these materials beyond end-of-life within efficient closed-loop systems. This digitally driven process demonstrates environmental gains in a circular production system with less transportation between different manufacturing sites, fewer materials and chemicals, and vastly reduced water use. By cutting, finishing and seaming garment products in a single production line, many traditional finishing techniques can be replicated, that would otherwise require the use of wet chemicals or by combining materials that make them near impossible to recycle. Introducing a 'Zero Waste' and 'Minimal Seam' approach through engineered pattern cutting, garments are manufactured with a blueprint that reduces assembly steps and waste at the outset. A controlled mono-material composition in the production line enables endless recycling in a closed-loop cycle. The streamlined production steps in garments' manufacture consider its cyclability at the end-of-life.

Exhibit 2 DeNature: Coded materials generate unified identification for enhanced cyclability in a closed loop chemical recycling system

This exhibit was the outcome of Miriam Ribul's funding award from COST (European Cooperation in Science and Technology) for her proposal towards the development of a science-design collaboration with MFF researcher Dr Hanna de la Motte. The research was hosted at Chalmers University of Technology and SP Technical Research Institute of Sweden. The COST-funded research titled 'Design Possibilities in Regenerated Cellulose Fibres' explored chemical recycling in a closed loop context. The lead strategy for the exhibition of the design outcomes was 2, Design for Cyclability (figure 51).



Figure 51: Hand 26 shows DeNAture's lead strategy 2, followed by strategies 1, 3, 5, 6, 8, 9 and 10.



Figure 52: DeNAture and Design Possibilities in Regenerated Cellulose Materials

Figure 52- Design thinking can be applied in different contexts to aid systems for cyclability through strategies for communication of material information. The collaboration of technical scientists and design researchers leads to new approaches for the identification and appropriate recovery of materials. This model proposes design interventions at the technical stage of material recovery and regeneration to facilitate closed loop chemical recycling. Materials are embedded with a visual coding system that traces the origin, processes, material type and recycling of the materials' lifecycle. Invisible chemical processes and compositions are translated into a pattern that can be read with UV microscopes and sensors, enabling a unified value system for transparency of materials' information. Through the design of information flows, materials that are derived from nature but altered in the process of manufacturing are retained in a closed loop lifecycle. This system speeds up identification and the application of the correct chemical processes at the end of its life cycle.

Exhibit 3 ASAP: Short life, carbon-low materials for fast recovery and repurposing for appropriate user behaviour in a high volume fashion context

The model for ASAP was initiated by Kay Politowicz and the development of a collaborative project with Dr Hjalmar Granberg at Innventia. Exploring the potential for paper-non-woven materials as a connection of design to a technical industry, the project also included research from Kate Goldsworthy, and design consultancy from Sandy MacLennan and David Telfer. The lead strategy for the exhibition of the design outcome was 5, Design that Explores Clean/ Better Technologies (figure 53).



Figure 53: Hand 24 shows ASAP's lead card strategy 5, followed by strategies 1, 2, 3, 4 and 10.



Figure 54: A.S.A.P Paper Cloth and A.S.A.P paper samples

Figure 54 - A wearable, non-woven material developed with Innventia (P6) with both convincing aesthetics and performance is at the core of a revolutionary approach to fashion sustainability. This system dramatically fast-tracks a garments' life cycle from production to end-of-life though desirable fashion products that acknowledge the consumer's needs for inexpensive fast fashion through disposable garments with recoverable materials. It eliminates the 'consumer washing' phase and therefore removes its large carbon footprint. Through the collaboration of designers and scientists, the mass production of various blends of wood fibres and PLA fibres from an existing industry, can be separately recovered to break new ground in cyclability, including the molecular recycling of thermoplastics. The aim is to connect compelling strategies for economic growth with sustainable business models for short life garments. Raw materials are developed to offer alternative, renewable qualities as a complement to the resilience and durability of an existing, classic, wardrobe.

4.2.2.2 social models: developing models for social innovation

In this theme we explored designing for new business models and social systems which sit mainly outside of the established industry norms. These new and emerging phenomena can be represented in the 'long tail'; often niche and small scale initially, but certainly not without significant potential impacts on consumer behavior and industry. It includes fashion libraries, collaborative consumption, co-design, social networks and craft practices. Results will be seen in the longer term as consumer adoption develops and grows.

develop
al systems



New Business Models

Designing for new business models and social systems (fashion libraries, collaborative consumption, ethical production, local communities)

Exhibit 4 Sweaver: Discarded Swedish fashion comes high-end upholstery and accessories when crafted by a network of cabin weavers.

Lead strategy 1, Josefin Landalv. The brief was to respond to consumer research of local Swedish consumption habits.



Figure 55: Hand 29 shows SWEAVER's lead card strategy 1, followed by strategies 6, 7 and 9.



Figure 56: SWEAVER hand woven sample collection

Figures 55 & 56 - Textile waste can be woven into new durable fabric through the use of traditional Swedish rep weaving techniques (ripsväv). Rep weaving was commonly used to utilise the very last scraps of household textile waste. Looking at textile consumption habits, donated or discarded clothes are made into weaves with durable TENCEL yarns. The designer proposes an investigation into how a linking system and service might be set in place between Swedish weavers and its consumers, tapping into an existing network of cabin weavers and creating new products as an outcome.

Exhibit 5 Fast ReFashion: Designers who provide democratic upcycling design services for users, employ online and domestic tools

Lead strategy 9, Becky Earley. The exhibit was the outcome of a peer-reviewed workshop at EAD in Gothenburg (2013) for MISTRA Future Fashion and part of the Top 100 body of work (1999 – ongoing). This item was created early on in the curation process, and formed a model for how a designer with a specialism (print design, upcycling polyester) could have a lead card, but consciously extend their practice by 'playing' other cards (figure 57).



Figure 57: Hand 31 shows Fast ReFashion's lead card strategy 9, followed by strategies 1, 2, 8 and 10.

Figure 58 - This designer's approach is to transform the industry through designing fashion services, rather than new products. The work facilitates consumers to create a monomaterial-refashioned garment for themselves, using readily available tools and resources like irons and paper. The service offers consumers support through events, demonstration films and downloadable instruction kits. This enables participation in the design process, and a new understanding of textiles processes that could lead to transformed user behavior. Consumers engage with materials and products towards closed-loop thinking and action.



Figure 58: Fast ReFashion and Black Hack Chat workshop and overprint making process

Exhibit 6 Smörgås Board: Designers who provide playful tactile tools for users, empowering them with democratic digital design approaches and emotionally durable products

Lead strategy 9, Melanie Bowles and Kathryn Round (figure 59). The brief was to explore the democratisation of design, the research expertise of Melanie Bowles, with Swedish cultural references to explore local production.



Figure 59: Hand 28 shows Smorgasboard's lead card strategy 9, followed by strategies 5, 6, 8 and 10.

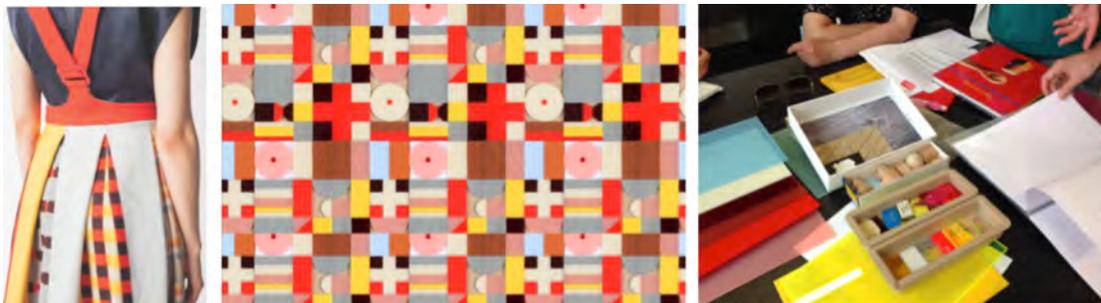


Figure 60: Smörgås Board garments, Smörgås Board pattern, and toolbox design process

Figure 60 - Hands-on games encourage analogue play and participatory design. This project gives people a system to encourage confidence, creativity and play leading to an understanding of the design process. A 'pick and mix' approach of a toolbox of pattern, colour and quality offers a DIY design loop to print, make and wear. The pattern modules can be further translated digitally to create bespoke printed fabrics. Empowering the consumer to be creative and to gain new skills through being involved in the design process may encourage emotional attachment that leads to products being better looked after, cherished for longer or purchased with more consideration.

4.2.2.3 mindsets & the self: designing for attitude change

This is the most 'future facing' of the themes - and is a concept that comes primarily from the PhD research project - seeking to change mindsets and culture. The desire for such change was also encountered in several of our industry workshops through identifying barriers to industry improvement. It is not possible to make these changes quickly and requires a major shift in world-view for many stakeholders in the current system. The approach is activist in nature and encourages more 'mindful' user behaviour. It also relates to the great potential of institutional change and 'embeddedness' of sustainable practices in industry at the deepest level.



Changing Behaviour

Designing to change mindsets and culture, activist approaches and mindful 'user behaviour'.
Institutional change and 'embeddedness'. Encouraging inner knowledge, reflexivity, altruism, empathy

Exhibit 7 Inner/Outer: The transition of design practice to an engagement with social issues is not simple, and designers will need guidelines

Lead strategy 10, Clara Vuletich (figure 61). The brief was to respond to the research in Shanghai for 'The TEN in China' within the framework of the PhD project.



Figure 61: Hand 33 shows Inner/ Outer Jacket's lead card is strategy 10, followed by strategies 1, 2, 6 and 7.

Figure 62 - In this model, the designer becomes a social entrepreneur that imbues meaning into textiles and fashion. Inspired by historical garments in a specific cultural context, through the process of hand making the garment becomes a symbol for 'psychic protection'. The design process connects inner and outer change through thoughtful making that enables psychic protection for the wearer as well as for the maker. Representing how a 'sustainability mindset' is needed for change, garments are made for emotional durability and connection. The designer's role is to create garments that allow for cyclability through a patchwork approach where the stitches and layers contribute to both the symbolic and the material aspects of sustainable textile/fashion design. The journey to becoming 'whole selves' is accompanied by material needs and constructs.

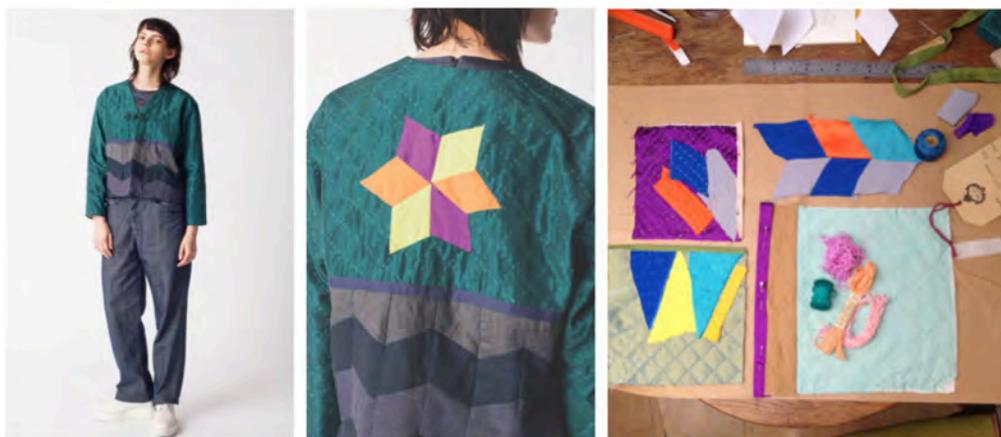


Figure 62: Inner/ Outer Jacket and fabric bricolage process

Exhibit 8 Shanghai Shirts: Aesthetics and symbolism, combined with upcycled garments, encourage better consumption decisions made by young fashion users

This exhibit developed from the first part of Becky Earley's research in Shanghai for 'The TEN in China', a project that was built on the proposal of PhD researcher Kirsti Reitan Andersen to explore the supply chain of garment production in a local geographical context. Through the collaboration with Project 1 of the MFF consortium based at Copenhagen Business School, this design approach was linked to the research of business models and the designer as intermediary change maker. The lead strategy for the exhibition of the design outcome was 10, Design Activism (figure 63).



Figure 63: Hand 25 shows Shanghai Shirt's lead card strategy 10, followed by strategies 1, 2, 3, 4, 6 and 7.



Figure 64: Shanghai Shirt process and Shanghai Shirt details

Figure 64 - By stitching second hand garments together, home made garments reflect upon the need for us to consider the disconnect that exists between the people in the supply chain. Through the exploration of upcycling polyester shirts and exhaust transfer printing, the designer can turn simple, inexpensive shirts into something of much higher value, and potentially imbue it with greater meaning, significance and emotional durability for the owner. By using overprinting techniques, the garment is embedded with symbolism and messages for young consumers, fusing visual research from the geographical contexts of where the garment is produced and worn. Garments are reconstructed so that the evidence of the original piece is still visible. Painstaking work by hand through hand stitching, reminds us to always consider the people who make our clothes.



Fig 65a: Harvey's Chopstick Headdress, made after the field research in Hong Kong, for Redressing Activism (2014)

Exhibit 9 ReDressing Activism: Upcycling and activist approaches inspire, educate and support emerging fashion textile entrepreneurs

This exhibit was the outcome of the second part of 'The TEN in China' research in Hong Kong. As in the first part of the research, the designers' role was to immerse within a local geographical context. The lead designers were Becky Earley and PhD researchers Emmeline Child and Bridget Harvey. The designers developed the work in response to local activist organisations. Here the work was co-designed with local designers using upcycling strategies and with the exploration of cultural references. The lead strategy for the exhibition of the design outcomes was 10, Design Activism (figure 65b).



Figure 65b: Hand 27 shows Redressing Activism's lead card is strategy 10, followed by strategy 1, 2 and 6.

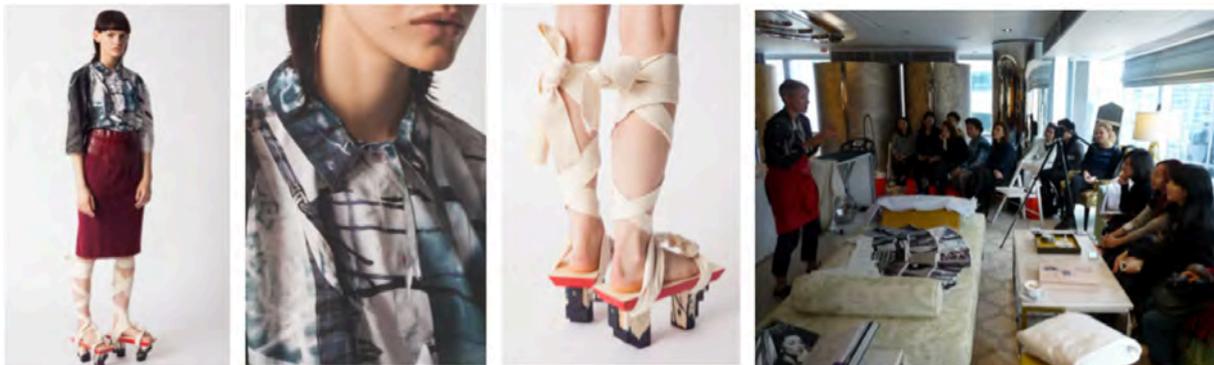


Figure 66: Redressing Activism and the Redress Forum 2014 Designer Challenge, Miele in Hong Kong

Figure 66 - The design of garments can propose waste reduction through demonstrating strategies for upcycling. This is achieved to highlight the global relationship between waste, the actions of the designer, the industry and food production. Inspiration for upcycling can be found in the activist organisations and culture, as well as the colours, food and architecture of a geographical context. Activist upcycling strategies can include co-creation workshops where the designer facilitates industry designers in an educational project to encourage them to use recycled materials to their practices. One technique can use traditional local foodstuff with domestic tools to create an upcycled monomaterial designer garment.

Exhibit 10 Library Jumper: Designers employ collaborative consumption and collective repair approaches.

Lead strategy 8, Bridget Harvey (Figure 67). Building on the PhD candidate's research into repair strategies, the brief was to explore design for new business models in Sweden including fashion libraries.



Figure 67: Hand 30 shows *Library Jumper's* lead card strategy 8, followed by strategies 2, 6 and 10.



Figure 68: *Library Jumper*, detail, and tools

Figure 68 - This brief was originally named *A Jumper to Lend*, *A Jumper to Mend*, and sought to design a product that was made to be easily repaired on multiple occasions. The PhD researcher evolved the brief in line with her interests, to create *Library Jumper*, a reflective piece centred on a conceptual repair kit.

Designing textiles and clothes for fashion libraries requires new design and systems thinking. The constant wearing down of the businesses assets will mean mending is essential. In addition to exploring the influence on self during the process of designing and mending, models are needed to analyse what a repairing process for a material is. Wardrobe maintenance is highlighted through visible colours and textures of the fixing yarn. Repair is embedded into garments with a visible 'slogan'. A conceptual repair kit and a factual repair kit facilitate and inform remaking and unmaking processes, and the affect of repair on the material future of the garment.

4.2.2.3 key insights from practice based research

Materials Systems: Design Approaches Towards Systemic Change and Design for Cyclability

This became about recognising that there are proactive and reactive approaches to designing for cyclability and seeking, through practice, new insights about how designers might be more proactive in future scenarios. Communicating the complexity of the range of approaches embedded in 'design for cyclability' was a challenge. The approach should not be limited to using waste-streams as a material input for design, rather it should work at a more systemic level in order to proactively design with resources so that they do not degrade or lose value in future cycles of use. It is often difficult for designers to incorporate this into the design process but, through the workshops and resources developed, new ways to engage with the complexity have emerged.

Designers need support in understanding what they can do in 'design terms' to move towards systemic change and a circular economy.

Sustainability research projects require inter-disciplinary teams to be effective. Design methods and approaches often differ from those of scientific research. 'Designerly' methods which envisage possible futures combined with scientific analysis of existing phenomena creates maximum effect. In order to create new circular economy concepts which can be embedded into industry there is a need for designers to work across disciplinary boundaries. Insights on this type of collaboration were gained from a sampling project using laser-welding technology, towards circular economy concepts.

Textile designers need to work in engineering collaborations to create new circular economy concepts.

The curation of an exhibition – a moment to show the work in a challenging and highly creative context – can enable researchers to bring ideas to a realised material form. The insight generated from the curation and making process, along with feedback from exhibiting, can give researchers new ideas to help them refine and improve the work moving forward. In this particular case, the Textile Toolbox exhibition enabled the co-curators to understand more about the potential to explore designing for the speeds of fashion garments. Creating the design prototypes for this exhibition resulted in researchers identifying the need to create guidelines for designing for 'appropriate garment speeds'.

Two of these design prototypes (ASAP and Fast ReFashion, figure 69) explored 'designing for cyclability' as a proactive approach to improving the retention of material value within 'circular fashion systems'. Designing in order to enable joined-up cycles of material use is the ultimate aim for both approaches, but this 'speed' of cycle creates very different challenges when making informed and appropriate design choices. The two approaches are deliberately extreme opposites; 'short-life' closed-loop garments are complementary to 'long-life' user engagement strategies. Both can have an 'extending' affect on materials in the value-chain; one by keeping products in use over multiple cycles in perpetuity, the other by extending the single use cycle of a

product over time. By exploring this polarisation of 'speeds and needs' we aimed to gain insights into creating an effective circular materials economy, which acknowledges the complex nature of our current and emerging fashion system.



Figure 69: A.S.A.P. Paper Cloth samples and Fast ReFashion 'Fractal Shirt'

Designers need to combine considerations for product speed along with strategies for design for cyclability

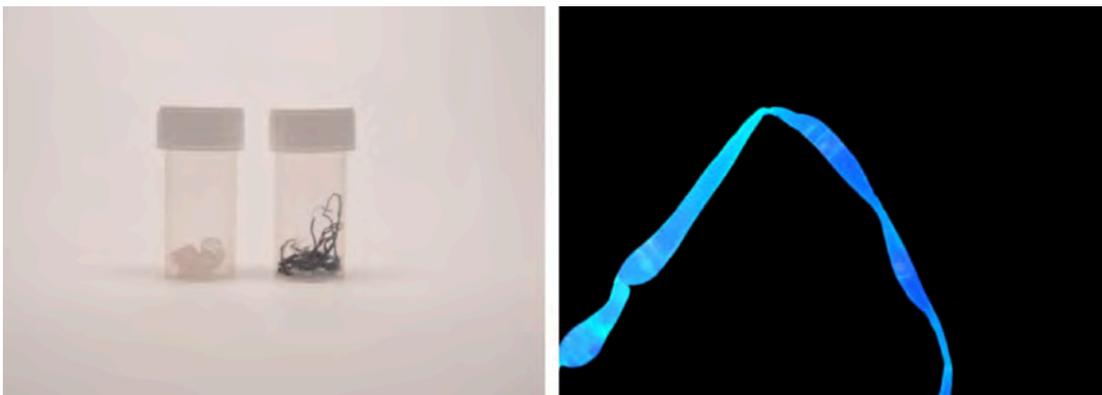


Figure 70: Left, regenerated cellulose fibres from cotton and denim, and right, coded regenerated cellulose (Ribul 2014)

The DeNAture work (figure 70) pursued new creative textile ideas through a design residency within a scientific organisation. Using observation, conversation and hands on testing, the designer was able to make a proposal about an existing problem. This proved to be inspiring for the scientist, and the designer was able to use the idea to develop an artistic piece. The freedom to think differently about a problem, from the perspective of another field, can be valuable when seeking to address 'wicked' problems.

Textile Design Thinking is a valuable method in scientific research to connect stakeholders across the supply chain through models for systemic change

Social Models: Developing models for social innovation

Josefin, the designer behind Sweaver proposed an investigation into how system and service design might be used to create links between Swedish weavers and consumers,

tapping into an existing network of cabin weavers and creating new, upcycled products as an outcome. Connecting up the 'long tail' (Andersen 2006) can lead us to multiple small-scale business models that may challenge the predominance of the larger fashion companies.

This exploration of alternative models was continued in the Fast Refashion project, which enabled user participation in the design process, leading to a new understanding of textile processes that could lead to transformed habits and behaviour. Here, it is proposed that consumers engage with materials and products towards closed-loop thinking and action – creating complementary loops to work alongside the larger loops of industry (Goldsworthy 2012).

In the Smorgas Board project hands-on games encourage analogue play and participatory design. Empowering the consumer to be creative and to gain new skills through being involved in the design process, may encourage emotional attachment that leads to products being better looked after, cherished for longer or purchased with more consideration (Chapman 2005).

Designers need to experiment with systems and service design, participatory approaches and game play to explore alternative business models and short closed loops for users

Mindsets & the Self: Designing for Attitude Change

In this theme new models were explored to analyse what a repairing process for a material could be. Library Jumper asked us to think about the origin of the material, the process of transformation through make, wear and repair, and the notion that materials need to be 'returned' after use. In Shanghai Shirt we considered how hand stitching can remind us of the labour involved in the creation of our clothes, and that symbolism in print and stitch can be a useful way to carry messages to users.

In the Redressing Activism project upcycling strategies included co-creation workshops where the TED designer facilitates industry designers in an educational experience to encourage them to use recycled materials to their practices. Hands-on learning experiences are key for knowledge exchange between cultures and fields.

Designers need to understand the impacts and opportunities of design in production countries through field research and understanding cultural values

tools

pp.114–130

Which tools can help stakeholders redesign and design products and systems for a more sustainable industry?

4.3 new design tools

This body of work responded to Aim 3: *Create a new online resource for the stakeholders to inspire, educate and connect.*

In this section the TED team and guest researchers reflect on the nature of design tools for sustainability, their use in redesigning products, and which tools meet the needs of specific stakeholders.

4.3.1 overview of design toolkits

Anja Connor-Crab

Design toolkits have become increasingly popular as a vehicle for knowledge transfer from academia to industry. They are often developed as a means of applying research in professional settings and generating impact beyond the academic community. Toolkits occupy a potentially powerful position in creating a shift toward sustainability in the fashion industry.

The Human Centred Design Toolkit (2009) by design consultancy IDEO is one of the most widely cited social design resources. Its forerunner, the 51 Method Cards deck (2002), can provide inspiration at the ideation stage of the design process and is also available as a smartphone application. An additional Field Guide offers case studies and worksheets (2015). While IDEO's toolkit focuses on social design, the 'Making' app (2012) by sportswear corporation NIKE addresses the environmental impact of materials used in clothing, footwear and accessories. 'Making' aims to support designers as data from the brand's Materials Sustainability Index (MSI) is presented visually with rankings based on their 'environmental attribute score'. Nike's MSI was adapted and incorporated into the Higg Index (2012), a self-assessment tool by the Sustainable Apparel Coalition, a multi-stakeholder trade organisation. A lifecycle approach is designed to measure the environmental and social impact of clothing and footwear. The organisation's most recent version (2013) features a tool suite.

A benefit of toolkits is that they communicate abstract ideas into manageable visual 'nuggets'. Collectively, the tools described above provide both micro and macro views, as well as technical and conceptual support on social and environmental aspects of sustainable design. Physical cards can be used for interactive workshops, while websites are accessible worldwide. Open-source formats mean that information can flow from tool users to producers and back again, allowing the tool to grow over time.

A reflective mindset is key to ensuring a toolkit is, and remains relevant to its users.

Some authors have criticised design toolkits, stating that there are currently excessive tools with insufficient testing (Baumann et al 2002). In addition, Kimbell (2013) insists that there is a lack of critical reflection regarding their purpose and viability. Critics also state that these 'tools' do not reach designers because they are poorly distributed (Thackara 2010).

My ongoing doctoral research examines if design toolkits are indeed relevant and how designers can be adequately supported. In order to gain insights into how fashion designers utilise their 'tools of the trade', I conducted case studies with what may be regarded as exemplar fashion SMEs. It was found that designers drew on a range of tool types, which are often used in combination with each other. These include physical making tools (e.g. mannequin, fabric and scissors) and information tools (e.g. books, websites and fellow professionals). While none of the participants had used design toolkits from academia, they had their own methodologies in place and used various tools to support them in their practice.

Therefore, tools are artifacts that can break down barriers and build bridges between two actors, between designer and garment, but also between designer and researcher. Phase two of my research consists of an interview study with toolkit developers. The data showed that it is vital to develop tools in close collaboration with end-users. Academia influences industry and - with information flowing both ways - industry in turn also informs academia. Expressed within both data sets was the need for a toolkit with a range of tools that compliment each other. It also became clear that more research is needed in terms of measuring the impacts of a tool in the long-term.

4.3.2 card games as design tools for sustainability

Barry Waddilove

Card games are becoming increasingly popular in design research as a method to encourage engagement and collaboration from a wide variety of stakeholders. The System Innovation Cards, developed by Barry Waddilove during research for the Ellen MacArthur Foundation, were an attempt to reveal a transition route from linear to circular business models through active game play. It was clear to Waddilove in early research that many companies which consider sustainability initiatives often focus efforts in one area of the business without properly accounting for consequences elsewhere. System cards were therefore a useful approach to explore the breadth and complexity of a problem whilst also encouraging input from a wide variety of stakeholders both within and outside the business.

One benefit of a card-based approach in design research is that contributors are transformed from relatively passive "participants" into "players" who are proactively involved and mentally engaged.

Imagery on cards should be simple enough for open interpretation whilst also provoking comment (Wölfel & Merritt, 2013). Additional information can be added to cards using sticky notes; this approach helps to encourage a player's "ownership" of

the growing game. When used in this way, cards may enable a designer to gradually build information complexity during game play and encourage ideas from outside of the interviewee's normal job scope. Playing in teams can provoke further collaboration and education between different roles and organisations, creating truly systemic solutions.

Cards are often used to make key themes more visible and provide structure to otherwise random brainstorming. Waddilove's 'System Innovation' approach (figure 71) was designed to also deliver solutions through layered game play which gradually reveals the interrelatedness of problems and solutions. Opportunity niches play a significant role as the seeds for change in any organisation (Geels 2004) but these seeds need nurturing by collaborative teams before they can become fully-fledged projects. Gamification has a vital role to play in encouraging sustainable systemic solutions from a variety of stakeholders.



Figure 71: Waddilove's System Innovation Cards

4.3.3 TED's tools for redesigning products

The TEN cards can serve as practical guidelines to examine, survey and highlight the problem of sustainability and the role of designers in change and innovation. They present visual evidence of strategic thinking. Each card identifies a significant, critical area for attention in the lifecycle of the product and suggests a strategy for analysis and change; approach and resolution; consideration and action, acting as a tool to overcome the barriers to improvement. Developed with a focus on textiles and fashion, they have a potential role in generating strategic concepts for the design process generally. They offer a persuasive prototype from design research and are a research tool in themselves, whose relevance becomes clear when used to facilitate design workshops. The cards promote group discussions, game-play and role-play formats with a workshop setting. They are offered as a range of entry points for positive research-led engagement from the practical to the idealistic. In using the cards TED researchers feel that their thinking, and therefore themselves, undergoes some form of transformation.

Making tools can be transformative for research, and for the researchers themselves.

More cards can be added in when the design considers a systemic approach, complementing a holistic vision for future fashion. Each lead card was reflected in the design researcher's practice. Through the direct or referenced consideration of interdisciplinary collaboration for the outcomes, the designers included more strategies in the final outcomes.

The Lead Card reflected the ACTION each design researcher chose to pursue.

From the outset this research recognised the need to be online and visible, to a direct audience and also a broad global audience. The researchers knew prior to this project that accessing a range of digital and 'real' tools to create appropriate and impactful ideas and insights was crucial. The project web platform itself was therefore our most essential design tool to make things happen, and to increase impact and user value.

Web platforms can be used as a research tool: to experiment and test ideas; to invite and support collaboration; to build networks, communities and stakeholders; and to disseminate and communicate the outputs as the project work progresses

The entire project was based on a tool, to some extent. A few of the key stakeholders had seen The TEN in action before the consortium was formed. The TED researchers actually produced the first set of cards right at the beginning of the project – September 2011 – to get 'tooled up' to go and deliver a workshop at MIT Media Lab in Boston, USA. The workshop was for a group of the top CEO's at VF Corporation. Prior to this the cards were credit card size and printed on a desktop printer. The facilitators, Earley and Politowicz, intuitively knew that well designed and produced tools – the first set of professionally designed and printed cards – would encourage participants to think of the sustainability ideas that were being presented as directional and appealing.

Well-designed workshop tools give both the facilitator and participant confidence in the process

We translated The TEN strategies for the research in Sweden and China (Figure 72). The translation of the strategies revealed how terminologies change in the different cultural contexts. The translation was achieved through several iterations as we engaged our network to gather feedback on the text. These tools were well received by the audience and we gathered feedback on the strategy from the local cultural perspective. This included how certain terminology for sustainable design such as Zero Waste can have different meanings when translated and taken out of context.



Figure 72: THE TEN cards in Chinese & Swedish

Tools need to be flexible and culturally relevant

The Worksheets (Figure 73)

One key element to the development of the workshops was mapping and designing workshop tools for the research in large companies, with small and medium enterprises and with emerging designers. The team developed and refined the workshop tools through an iterative process. While some tools were created with the support of a graphic designer, the team developed most worksheets internally, as the tools were refined and changes promptly adopted during the research process. We tailored the tools to the aims of each individual workshop, and included considerations about audience participation. The tools supported the design thinking process during the workshop, and acted as documentation of the workshop outcomes for data collection, review and subsequent analysis.

The team designed printed worksheets to document and structure the design process through specific sets of questions, while also encouraging design techniques such as drawing. Feedback from designers participating in the workshops was positive as they appreciated working with specifically designed tools.

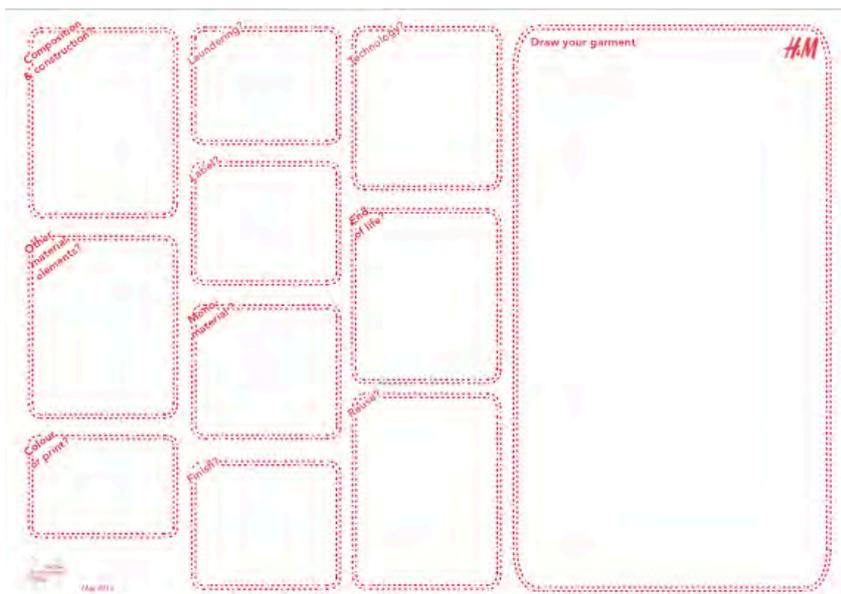


Figure 73: TED Redesign Audit Sheet for H&M

The Prezi Shows

Prezi was used as a presentation tool for events and as introduction to workshops. This tool was used to support lectures and presentations with visual evidence to inspire through design. We populated the Prezi with examples from the case studies review, as well as key images of events and project deliverables. The use of Prezi explored presentation techniques that differentiate from a linear narration tool to an interconnected one, as the set up built a landscape of examples that was accessed in a non-linear way.

Careful consideration between the researchers and the key stakeholders was given to the scale of the innovation case study; its proximity to market, not being too 'crafty' or outside the current business model, to avoid making designers feel powerless to act.

The Case Study Cards (Figure 74)

We transformed the examples gathered through the case study research into cards that were printed and included in the toolbox. The card format was based on one A4 sheet that was folded in half: the front of the card included an engaging visual to represent the example; the back of the card included a 100-word description of the example and a web link to find out more about it. The inside of the printed card included three fields to gather comments, information about where the example was sourced from, and the date of use of the card. The inside of the card was blank as it wanted to encourage sharing of the examples in the team with comments. While the participants did not use the cards for feedback, the tool was useful for the workshops where participants selected cards and examples in the different tasks.

Overall, the cards worked best when participants worked closely with a TED facilitator – this was one of the few tools that needed to be used in conjunction with the team. In some cases, according to participant feedback, it was the team facilitator that seemed to actually *be the tool* (Hornbuckle *et al*, 2009).

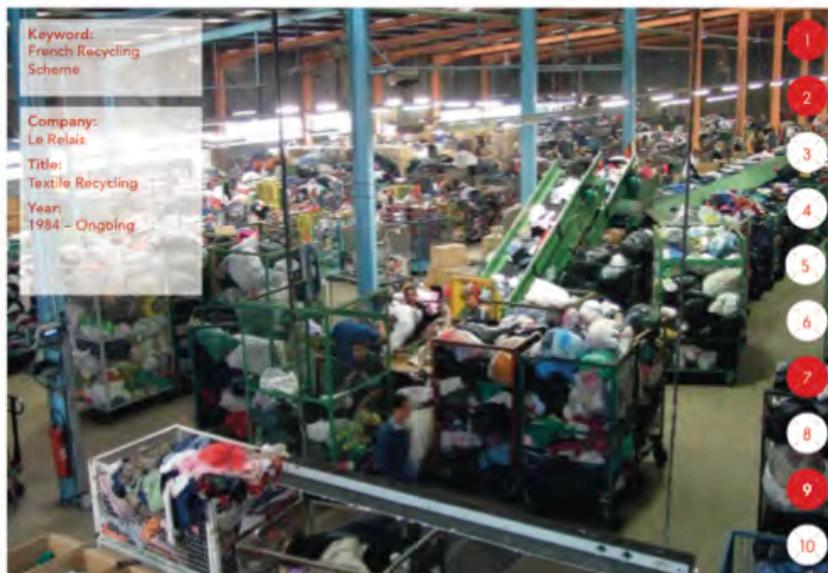


Figure 74: TED Case Study Card

Case study cards need to be carefully researched, designed, edited and presented in order to ensure that designers feel able to act on them – a balance must be achieved between inspiration and activation

The TED RED Box (Figures 75 and 76)

The researchers took great care to design bespoke tools for the designers at H&M, intuitively understanding that good design engages the interests of designers. Having something to construct; to fold and make; to fill and file, gets designers more involved, more active, in a workshop scenario.

A red toolbox was designed to include all case study cards in divider folders for each strategy. The toolbox was designed as a file that can be sent to a laser cutting company, cut in cardboard and individually assembled with minimal use of adhesives.

This toolbox was used as a physical tool for the case study library we developed for designers at H&M. Instead of providing a digital library, we tested this as a model for informal discussion of the case studies in the team. We discovered the time-poor designers could not make use this physical tool as a group, indicating to us that in future online digital resources, accessed individually from desktop computers, would perhaps provide more usable training tools for large companies.



Figure 75: The Textile Toolbox Toolkit contents and THE TED RED BOX

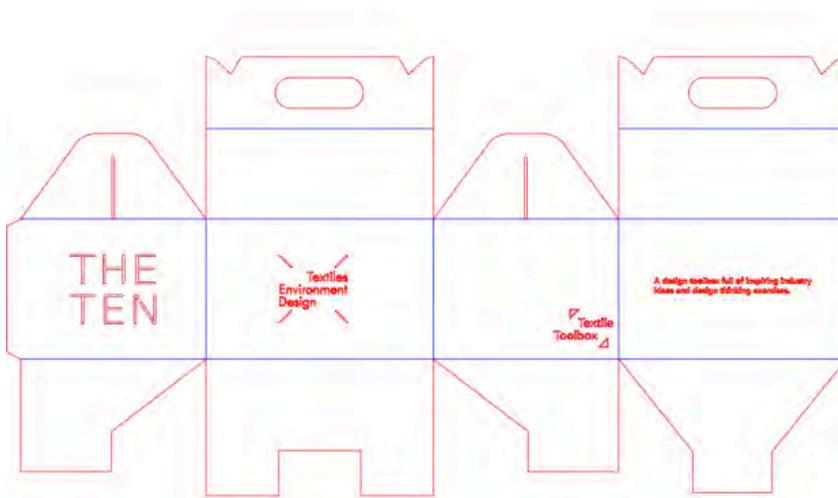


Figure 76: The TED RED BOX layout design

Well designed and produced physical toolboxes can make designers feel provided for and supported – meaning sustainable design inspiration and innovation may be more appealing and attractive

The Time Stamps (Figure 77, right)

The researchers made stamps for 'Now' 'Near' and 'Far' to time code the examples that were used in the workshops through the cards. The stamps were applied

according to participants' perception of the time needed to implement the idea that was presented. As an outcome, a 'Now Wall' was developed with examples that workshop participants selected for inspiration. Feedback from designers in the H&M workshops was that projects could be time coded with 'Never', when they deemed an example would encounter too many barriers to be implemented in industry.



Figure 77: The TED RED BOX strategy divider / folder, and NOW, NEAR and FAR Stamps

Time coding innovation – now, near and far – can enable designers to identify the ideas that are most useful to them within the immediate company context

The TEN & Higg Index Redesign Sheet (Figure 78)

By working through the SFA platform Earley and Vuletich developed a new workshop format and tools that enabled the SME companies to measure a product using the Higg Index, and then redesign it using TED's TEN tools; and finally measure it again to see what improvements by design had been achieved. Below is the worksheet where the participants noted the original features and then wrote down redesign ideas in a different colour. The changes were noted using the Higg tool and the scores were recalculated. New scores ranged from 3% to 41% with the biggest gains coming from the companies that pursued making the product recyclable.

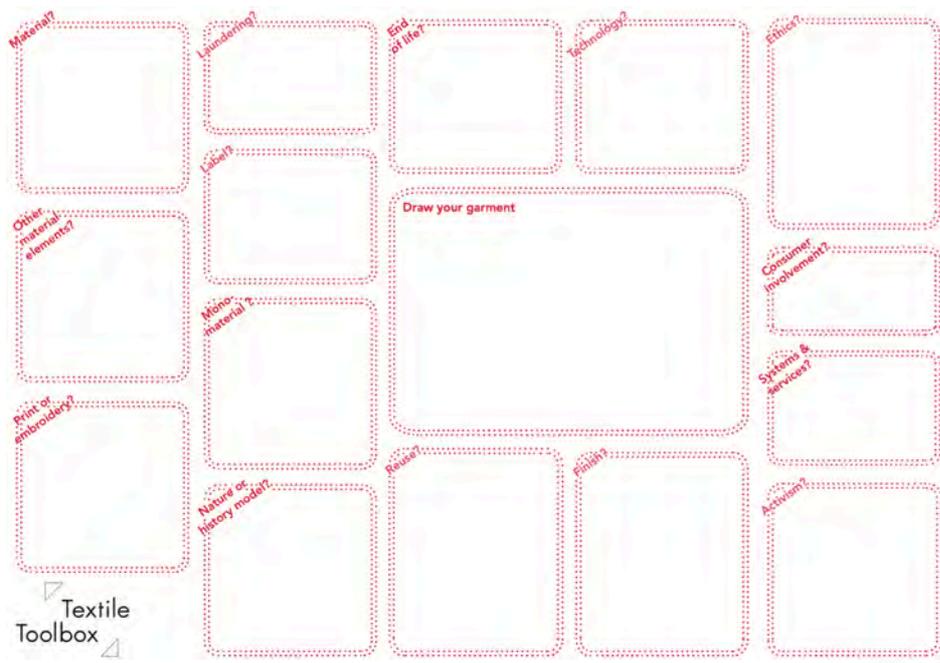


Figure 78: TED's The TEN and HIGG Score Sheet

Designers can use measurement tools like the Higg Index to gauge the effectiveness of new design decisions

4.3.4 key insights on using the tools

These tools were used to capture the current practice and mindset within a company. The results were achieved through direct engagement with the audience in workshops. The use of the tools evolved to insights about the need for special training programs for designers that start from developing a mindful and connected practice.

The Now Wall (Figure 79)

The Now Wall presented the case studies selected by the H&M participants as industry ideas that can be implemented right now. The participants' 'homework' was to try the selected case studies in their day-to-day work over one month by:

- finding out if a sample on the Now Wall is held in the H&M materials research library, to go and feel the sample and to find out more about it;
- contacting a supplier of one of the case studies and think about how it could be part of a current project, visualising the way it might be used;
- bringing one of the ideas to a team meeting and see what response it gets;
- using the H&M i-Collect in store recycling scheme and reflect on the returned items and the experience of returning items to the store.
-

As a second homework task, participants were also asked to take a blank card, and to find a new case study to add to the box. These did not have to be 'now', but represent a case study that interests them and is not currently in the box.

The Now Wall helped to embed the SDI programme ideas; enabling staff to see that sustainable design inspiration could be, quite literally, part of their everyday work activities



Figure 79: The Now Wall reconstructed after the workshop by the coffee machine

Barriers and Opportunities (Figures 80 and 81)

The TED task poster for Barriers and Opportunities was designed to capture barriers within the company or organisation, and to link this to potential opportunities. The barriers and opportunities work sheet focused on company specific barriers such as time, price, sourcing, and dissemination of knowledge internally and externally, size of company and press. Together the workshop participants mapped a set of creative solutions for each of the barriers.

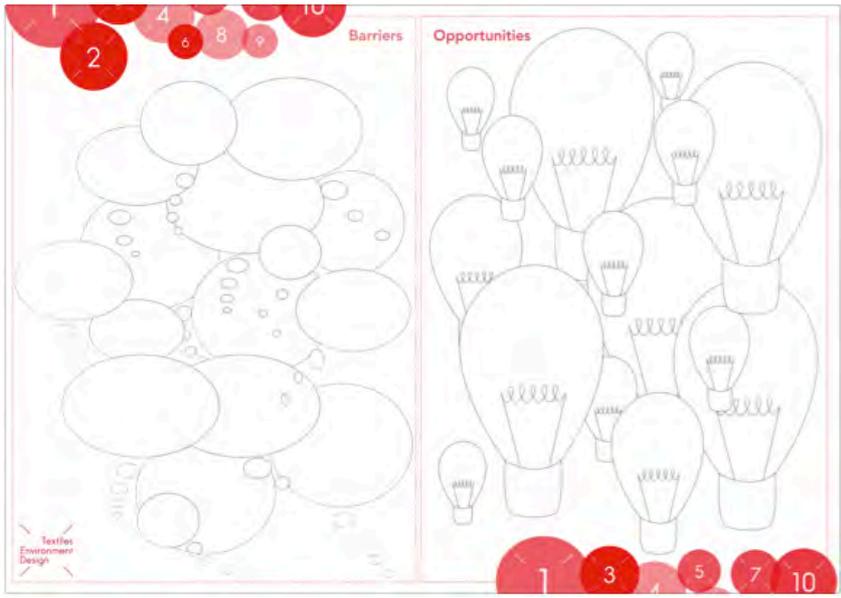


Figure 80: Barriers and Opportunities poster

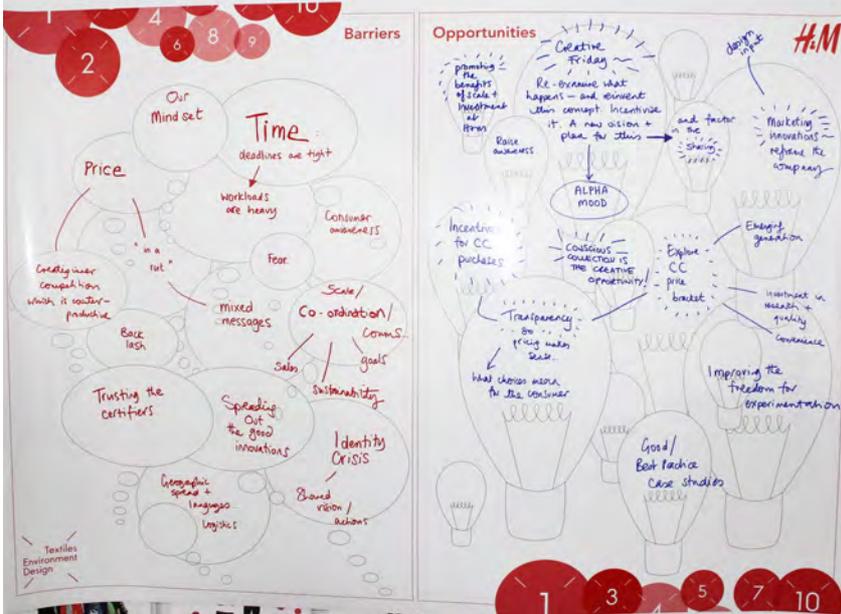


Figure 81: H&M Barriers and Opportunities poster

Barriers to Opportunities tools, like the TED task poster for H&M, can help unlock creative thinking in a design team who find their role within a company to be restrictive

The TED Postcard (Figure 82)

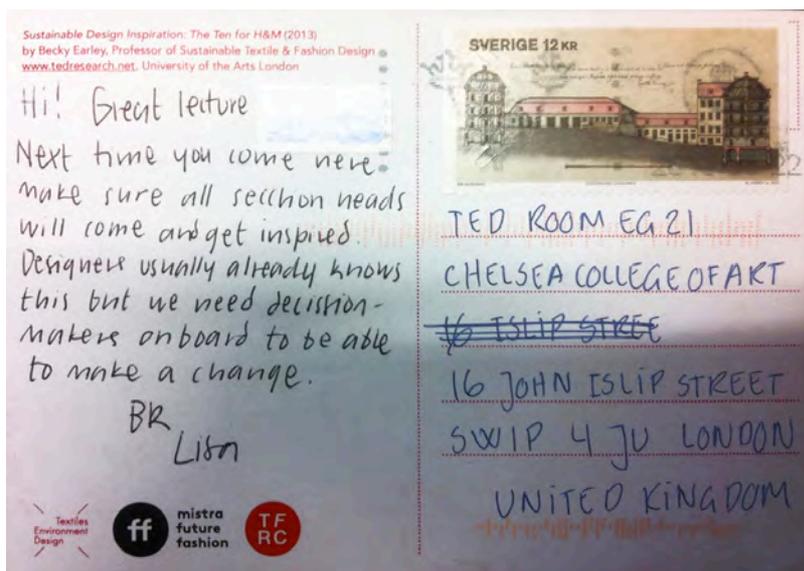
The idea to create a postcard to be used by the BO staff at H&M came from the experience of the 18-month planning phase for the project, reinforced by another industry engagement at the time, at Puma in London. When Earley was asked to give a keynote talk, as part of their 'Puma Sustainable Design Collective' (PSDC) programme (curated by Professor Jonathan Chapman) Earley and the team found a discrepancy between the information managers think their designers needed, and the information designers most desire to know more about.

In a pre meeting with one manager at Puma, using The TEN to discuss which strategies should be focused on during the 45-minute talk, a similarity with the H&M development process arose. Strategies 2,3, and 5 were seen to be of the upper most importance. This is what the leaders in the companies want their designer to know about. Prompted by the need to test whether this was what the designers themselves felt they needed to know, the Earley designed a short feedback form for the keynote talk, asking the Puma audience to prioritise The TEN for themselves – to make their own 'hand' – making their number 1 choice their 'lead card' and then ranking the other strategies in subsequent order. Where would 2,3 and 5 be placed by designers using this direct tool? The answers were revealing; the Puma audience wanted to see Design Activism at the top of the list, closely followed by Reduce the Need to Consume.

Earley decided to create postcards for the H&M talks, illustrating the visual fusion of The TEN with H&M's 7 Conscious Commitments, but changing the wording of these to reflect design questions (see figures 30-31, p.69-70). The back of the card was blank, but the team handwrote the TED address on it, and stuck stamps on, in the hope that some cards and comments would find their way back to London.

The comments received on the postcards varied: Some found the one-hour lecture too long, and they wanted to see fewer examples presented; others wanted the researchers to make sure the 'decision-makers' attended; one questioned the environmental impact of choosing to print and post rather than to do this process digitally whilst one very detailed response, from a young emerging designer, wanted to see the consultation rolled out to other departments.

Designers in large companies need to be given creative tools to communicate internally about sustainability, across divisions between roles, departments, responsibilities and locations



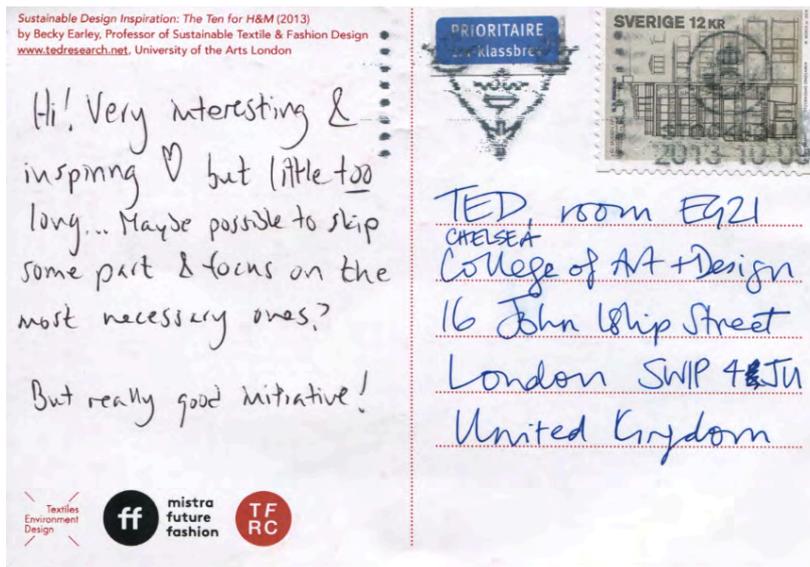


Figure 82: H&M Postcards sent back to TED in London

TED Team Training Tools

During the research the team developed new approaches for designers training designers; the team surveyed the value of this relationship and the potential of this emerging field of research. What do textile designers and researchers have to offer the corporate world of the fast fashion company, in terms of inspiration to incorporate sustainable design decisions into their every day work? If design decisions may account for up to 80-90% of environmental impacts (Graedel et al, 1995), then it is crucial that the massive producers of global fast fashion ensure that their internal teams are fully engaged with sustainable design.

Carbon emission reduction targets for 2020 (EU, 2007) require rapid change on a huge scale. Textile design researchers working in this field need to address volume production, and work at the corporate level. This journal article addressed the question: What new skills and capabilities do textile designers need to inspire sustainable design innovation in large fashion corporations?

Design researchers need special training to support other designers effectively, and in an inspiring and motivating manner

Personal Tools

In an era of increasingly limited resources we need designers who create by understanding sustainability, users and how to 'borrow' materials from a finite pool. As textile designers embrace service design, we need to teach openness, awareness, empathy, and consideration. For TED researchers, the last few years have been a period of thinking about *tools* and getting properly equipped for this brave new design world. The Textile Toolbox work exemplifies this.

But how do we move towards this new remit? How do we get our progressive ideas used in industry to have impact? When all around us are burning out in this under-resourced and over-subscribed system we need to reinvent *ourselves*. This conference keynote by Earley looked at the work by the TED team's for the Mistra Future Fashion programme, and in parallel the work they have been doing on themselves. Covering formal training programmes, management tools and techniques, and mentoring - as well as mindfulness, meditation, yoga, sleep and nutrition - we consider how reinventing staff development programmes for textile designers and educators could contribute to the mindset shift that we all need to embrace for a more sustainable future.

Training and tools can support textile designers in evolving a more mindful, innovative and connected practice

Everyday Tools

We complemented our dissemination of The TEN strategies through tools for different cultural contexts with a set of animations that provide a simple, illustrated introduction to the examples for each strategy (Figure 84). This helped to build a connection to design for each strategy, as examples were linked to visual prompts.

These animation tools were developed to communicate to a broader audience of consumers, educators and school children. They were available through our web platform, writing or workshops and used to link a global audience to the research. Through the use of tools in these different contexts, we tested the research ideas with a wide audience, and equally involved them in the research process.

When organisations put design at the heart of product and service development, they are triggered to ask the fundamental question about what they make, how they make it, and who for (Thackara, 2008). The approaches included within The TEN promote design thinking and demonstrate how textile designers can play a more strategic role to instigate social and environmental change. The workshop combined three of The TEN strategies by using design to replace the need to consume in order to 'upcycle' discarded garments (Earley, 2009). Design activism influenced the agency within this workshop and combined insights from two existing projects 'Black Hack' (Earley, 2012) and 'Old is the New Black' (von Busch & Ballie, 2011).

Figure 83 - The 'Black Hack Chat' project explored a new role for professional fashion textile designers, which enabled them to exchange their skills and experience through facilitation of this design intervention. The aim was to push the boundaries of fashion textile design practice through co-design to identify how it can be used as a tool for citizen engagement. A dynamic idea needed dynamic tools, and the TED team worked with film makers and animators to bring their 'instructions' to life. Skype was also used to deliver international workshops when the team were in another country.

Designers can develop tools to help consumers prolong the life of their wardrobe using simple domestic every day items

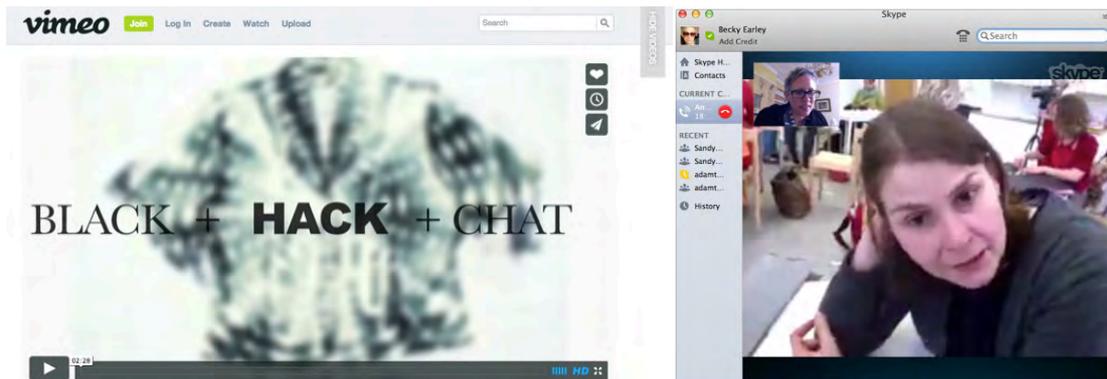


Figure 83: Black Hack Chat film; and Black Hack Chat Skype mentoring between London and Gothenburg



Figure 84: Stills from the project 3 intro animation and The TEN animations (2014)

Tools for Schools (Figures 85 and 86)

Working with the next generation of consumers will be key for systemic change, and the speed with which things happen. Designers can improve current curriculum offers around textiles by making the subject matter innovative, exciting and engaging for a younger audience. Digital and real-time tools are key to this engagement.

Regenerational Inventiveness: The nomadic toolbox encounters, responds and develops resilient textiles, filling with items from our everyday lives, changing and responding to each encounter. Acting as both archive and starting point, it's form, function and contents may change, as may site, user and circumstance but the basic premise remains constant - agents + tools = resilience. (Earley & Harvey 2015)

Earley and Harvey lined an art gallery with plastic sheeting, wallpaper lengths and

transitional textiles

pp.132–137

4.4 PhD research project results

4.4.1 new design decisions

In Stage 1 the PhD research sought to do a critical review of the TEN strategies. The focus was those strategies that address social impacts in the fashion supply chain including workers' rights in production contexts. A project was undertaken that tested a Design for Social Innovation (Manzini) concept with a US-based denim manufacturer. The notion of design decisions that support workers in production evolved to include three levels of design decisions – Design *For*, Design *With* and Design *Beyond the Product*. These three approaches were outlined in the blog posts written for the Textile Toolbox.

The designer can make a range of pro-active decisions to support production workers in supply chains beyond product manufacturing, to include co-design and design for social innovation methods.

4.4.2 new design models

The four projects undertaken during the research explored a range of new design roles and practices for fashion textile designers in the context of Design for Social Equity. There were three models developed from the projects:

Design for Social Textiles (Figure 87)

This model extends TT7 Design for Ethical Production and demonstrates a design approach based on the notion of 'social resourcefulness'. In this model the designer identifies a social issue in the local area (unemployment; skills/training) and creates a fashion/textile product or business model that supports that issue.

Designers need to expand their vision of design to include imagining new 'disruptive' supply chains

Sustainable Textile Design as Bricolage

This is a framework for a crafts-based sustainable textile design practice. Textile designers demonstrate unique methods and approaches to design and making, defined as a 'designerly way of knowing' (Cross). This knowledge is valuable for designers in new roles 'beyond the cloth' in industry contexts; and for understanding textile design knowledge in creative research. In the design literature, there are no existing methodological descriptions of a sustainable textile 'designerly way of knowing'. This paper proposes to contribute to this literature. The methodology included an auto-ethnographic review of the author's past textile practice, and a literature review of the 'bricolage' metaphor (Levi-Strauss). Five characteristics have been developed: Using limited resources; Designer as professional and amateur; Craft skill as Knowledge; Self/subjectivity; and Alternatives to Consumerism.



Figure 87: Design for Change denim bags

Sustainable textile designers demonstrate methods and knowledge distinct from designers in other disciplines; and this knowledge is useful 'beyond the cloth' in industry contexts.

The Heart-Shaped Designer (Figure 88)

This model extends Brown's 'T-shaped designer' to represent the attributes and skills of the future 'social' fashion textile designer. In a sustainable textiles context, the 'T' becomes an 'I' as the designer gains knowledge and skills represented by The TEN strategies. In a Design for Social Equity context, the 'I' becomes 'heart-shaped' as the designer practices 'beyond the swatch' as a facilitator and steward. In this context, the designer requires a range of skills for working with values - their own and all stakeholders in the fashion system.

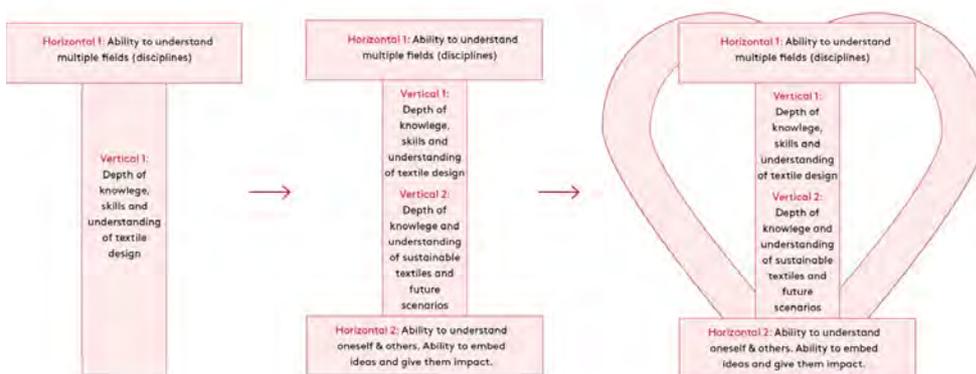


Figure 88: Left: Tim Brown's 'T' shaped designer (2006); becomes the reflective and self-aware 'I' shaped designer (centre, Earley et al, 2015); and then becomes the heart shaped 'social' designer (Vuletich, 2015)

Holistic Fashion Design

There are a range of future-focused models that propose what systemic sustainable

change in the fashion industry may look like. Models such as circular fashion are based on qualities of circularity, holism and values. For textile fashion designers, these industrial and social contexts will require new skills, roles and methods. Using a fictional character device, this paper demonstrates a future model of the fashion system from the perspective of a fashion designer. The authors (Earley & Vuletich) describe the character's career trajectory through her engagement with circular economy principles; her experimentation with materials, technology and system design; her empathy and social vision for production workers; and her political activism. The insights are based on current (and proposed) academic and industry research. The paper demonstrates the future professional contexts that textile and fashion design graduates will be working in, and the professional skills and training that will be required.

Education needs to prepare textile fashion designers for thinking and working in a holistic and empathic way, contributing to better products and social impacts.

Designing to Change Material Systems; Social Models; and Self/Mindsets

The final model was co-developed with TED researchers Earley and Goldsworthy to represent the three levels of change required in the fashion industry - Materials; Models and Mindsets. The researchers had collaborated on several research tasks, each with a specialised expertise - Goldsworthy (material systems); Earley (social models); and Vuletich (mindsets and the self). The model represents a design approach that is holistic and requires collaboration of all stakeholders in the fashion system.



Figure 89: Inner/Outer jacket (left), hand-stitched fabric samples (right)

Designers will require new skills and methods in a Design for Social Equity context that engage with deeper levels of mindset change

4.4.3 new design tools

The fourth Objective of the research sought to develop tools for fashion textile designers to operate in the context of Design for Social Equity.

The Question Cards (Figures 90 and 91)

These green cards act as a compliment or 'undercoat' to the red TEN cards. They are developed to illicit subjective values of participants when considering sustainability as a concept in design practice. The cards were designed to build trust and group cohesion at the beginning of a workshop. The cards can be printed on a desktop to encourage wide usage.

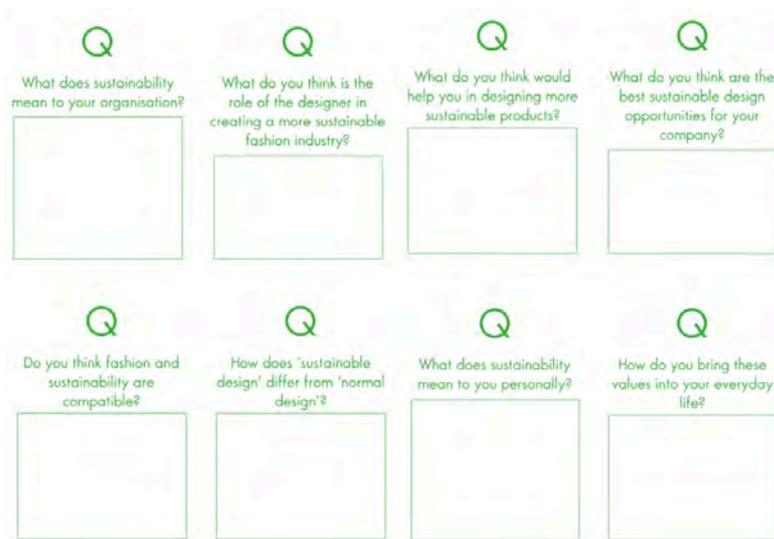


Figure 90: Green Question Cards (Earley & Vuletich, 2013)

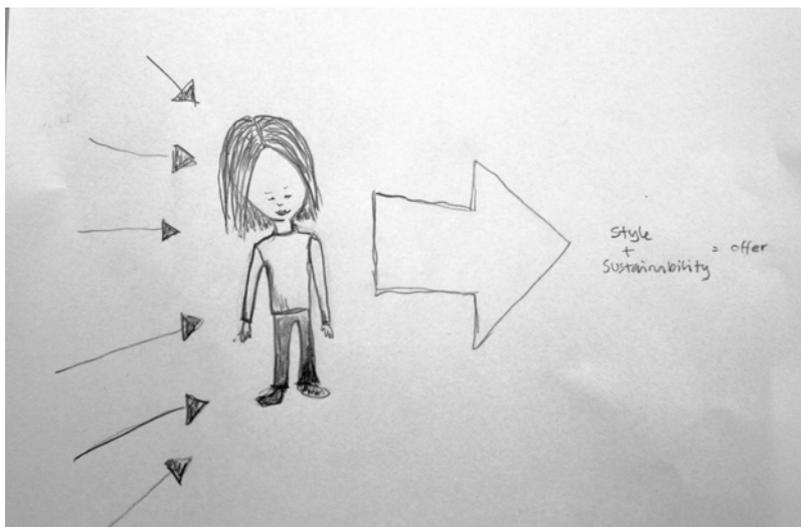


Figure 91: Drawing by participant in response to Green Cards, 2013

Workshop tools need to ease participants into the process, and relate the ideas directly to them personally and professionally

Textile Talk Kit (Figure 92)

This is a toolkit for fashion textile designers for use in production countries with diverse cultural contexts. In order to communicate and understand stakeholder views (production workers; supplier management; local communities etc) the designer will need the skills of a cross-cultural facilitator – empathy and understanding cultural values. The designer will also bring their traditional craft-based textile tools such as needle/thread for hand-stitching. A simple craft process can be a useful way to open up dialogue and build trust; and provides confidence for the designer in new contexts.

The kit consists of needle; thread; scissors; pin cushion; fabric; samples for demonstration; photo of designer's family/friends/life; camera; notebook; pen; favourite objects/paraphernalia.



Figure 92: Left, *Textile Talk Kit in use, workshop with garment workers, China, 2014.* Right, *Sutra Stitching Workshop, London, 2013*

Sutra Stitching Workshop

This is a workshop methodology that explores the relationship between hand-stitching and mantra meditation. Both activities increase general well-being and allow for participants to enter a 'flow' state. This method can be used to explore textile craft like hand-stitching, or other techniques such as crochet/knitting. The method can be used to support focused dialogue amongst the participants.

Workshop tools can be used to build trust amongst participants, and to create a deeper connection to subjective values and the self

PhD Project Conclusions

The concept of transition is based on systems-thinking; is emergent; slow moving; and accounts for deep human change from *having* to *being*. Re-defining sustainability as transitions

provides a more holistic and human-centred framework for the design practice. It also provides a framework for the current and future context that the fashion and textile designer will be operating within.

The research aim was to explore new roles for fashion textile designers in the transition to *Design for Social Equity* in the fashion industry: the research has defined the new roles and methods for fashion textile designers as *Transitional Textiles*.

Four projects were undertaken that followed an action research cycle through a range of emerging insights and enquiries. Following an initial literature review and review of The TEN, the first Project explored a Design for Social Innovation approach in a garment production context. The Researcher collaborated with a social business expert to devise a creative concept for an industry client. The aim was to identify design decisions and new roles for designers that support garment workers in production contexts. An outcome of the Project was a three level framework to identify new roles for designers in production contexts; and a model 'Design for Social Textiles' that focuses on design to support *social resourcefulness*.

The following two Projects involved the PhD Researcher collaborating with TED Project 3 researchers in facilitating for professional training workshops. The fashion textile designer will need a range of new skills when moving 'beyond the cloth' in industry contexts, working as facilitators of sustainable change.

Outcomes from the first Project were a model to describe the skills required of the 'heart-shaped designer' in these contexts; and a definition for a new role for fashion textile designers as Design Facilitators in Industry. The two Projects also identified the importance of values in a Design for Social Equity context. An outcome from the second Project was a workshop tool to elicit personal values from participants to encourage deeper engagement with sustainable design concepts. The final Project involved field research to China and the creation of a hand-stitched jacket. The emerging enquiry on values and the 'inner' aspects of sustainability became a central concern of the Research at this point. Following a creative workshop with garment workers in China, the Researcher used textile making to synthesise the overall research findings. Outcomes from this Project included a hand-made jacket; a model to describe three levels of change in the fashion industry (Materials; Models; Mindsets); a new role for fashion textile designers as Design Stewards; and two workshop tools to encourage cross-cultural understanding and mindfulness.

In conclusion, the research defined sustainability and textile making as *transitional*. The initial literature review identified that the traditional definition of sustainability is problematic and lacks the human/personal aspects. A primary insight gained from the research was the importance of the 'inner' aspects of values and mindsets in any change towards sustainability.

summary of findings

pp.139 – 153

5 summary of findings

In this section we summarise the key findings from the four stages of the project. The research aimed to examine the range of decisions that designers make during the fashion textile product development phase in order to gain new insight around which decisions can improve environmental and social profile within specific contexts.

To do this we used the framework of TED's The TEN and refined it to engage with a wide range of Swedish designers through action research workshops in order to create new redesign concepts, noting which design decisions they made and what improvements occurred.

We then used the range of decisions to advance the concepts further, into the realm of proposals for systemic change, by using practice-based research approaches to create new fashion textile garment models for exhibition. These included innovations with materials, garment structure, manufacturing processes, and systems and service design.

Throughout the project we created new tools and resources for the stakeholders to inspire, educate, engage and connect.

5.1 summary - new design decisions

Which sustainable design strategies do designers in fashion companies find inspiring?

An initial task undertaken by the TED team at the outset sought to revise the wording on the cards, using feedback from discussions with the stakeholders, in particular with the industry influencers (the lead participants from the partner organisations – SFA, H&M and Konstfack.) Although the cards had been used in broader contexts in previous projects, refining the wording for this audience gave stronger direction for creative action to be considered. We wanted to make sure that the strategies sounded inspiring from the outset. A stronger message for action could be conveyed by the use of the words 'Design to...' or 'Design for...' in each title of The TEN cards.

Through the landscaping work on the project blog and through discussion with the industry influencers, we found that for each workshop program we were being asked to tailor the information on offer: the larger the business, the narrower the range of strategies. The emerging designers at Konstfack would be presented with the full range of TEN ideas; whilst at SFA the full range would be presented, but only using case studies that were close to market; and at H&M only strategies 1-5 would be used, with case studies that were scalable and within two years of market. Design researchers need to tailor sustainable design information for specific stakeholders.

Through a series of workshops with SMEs at the Sustainable Fashion Academy (SFA) and design teams at H&M, we found that the use of new technologies was of the greatest interest to industry participants (5), specifically to reduce chemicals and energy in the production of new materials (3,4), which will also achieve a new aesthetic in textile and product development. (Figure 93)



Figure 93: Hand 1 combines lead strategy 5 with strategies 3 and 4

The difference in scale of company became most apparent when ideas around cyclability were explored. The fact that goods needed to come back via the consumer provided opportunities in the smaller company for innovation involving activism. This was seen as a USP (unique selling point) for such companies which gave them an advantage over the larger companies because of the flexibility of their operations. Designers in large companies reflect on (2) Cyclability strategies while SME's also include (10) Activism as a core principle.

With even more design thinking dexterity, the emerging designers at Konstfack were able to design for future scenarios from a very personal perspective, giving way to the creation of a manifesto. The manifestos were produced to enable the designer to work more effectively with others, more clearly communicating their own particular focus around the issues of sustainability in a future fashion textile industry context. Manifesto-making is an essential part of understanding what is needed when individuals work collaboratively towards systemic change.

The most future-focused research during this phase considered how, by being given greater creative scope to include the broadest set of strategic considerations during the design process, the designer's visions for the future could be more socially beneficial, as well as environmentally improved. An adaptable, flexible, diverse design approach may lead to more socially engaged practices.

5.2 summary - new design models (a)

Which sustainable design strategies do designers in fashion companies find most useful when redesigning and improving products?

We found that the consideration of product cyclability (2), aligned with new technologies (5), offered opportunities to redesign the material qualities and the construction of garments. (Figure 94)



Figure 94: Hand 2 aligns strategies 2 and 5

The idea of using a 'lead card' from the pack of TEN evolved from a parallel TED project with VF Corporation during 2011-12. For the VF Corp innovation summit exhibition, the team took one card at a time and created a new prototype. Working from the insight gained, here the team selected one card as the *lead card* (based on their expertise, experience and interests) and then played subsequent cards into the design brief to build a hand of cards that was unique to them. This prompted the designers to push their ideas into new territories, and to undertake research questions not previously considered. Working with *lead cards* and *hands*, the researchers and stakeholders were able to 'see things differently' (interview with Johan Ward, H&M, 2013). The *lead card* reflected the action each design researcher chose to pursue. More cards are added in when the design considers a systemic approach, complementing a holistic vision for future fashion.

However, simply being able to see a better future product was possible, proved not to be enough to shift the habits and practices that are the established ways of doing 'business as usual'. Over the four years of the project the TED researchers experienced

barriers that made achieving the systemic design visions impossible. This was perhaps not surprising given that the pilot programme was redirected by H&M as 'inspiration', rather than 'education', effectively requiring the design researchers to take a step away from the opportunity of achieving a lasting transformation.

Communication systems in large companies are complex and political; designers are often boxed up in restrictive departmental roles and kept too busy to attend inspiration or research sessions. Although original thinking may take place in the workshop setting, the designers often found themselves unable to action change once back at their desks. Infrastructural barriers in large companies may prevent sustainable design concepts being more readily and quickly adopted.

5.3 summary - new design models (b)

Which sustainable design strategies can be combined to create new models that signal systemic change?

In the third stage of the research we returned to the TED design studio in London to ask: **Which sustainable design strategies can be combined to create new models that signal systemic change?**

Through practice-based research we created a new framing of the field of sustainable textile design for fashion. We applied insight and observations from the workshops in the previous stage to propose that systemic change could most effectively be approached when understanding and combining material, social and mindset philosophies.

Systemic change needs to be regarded as a long-term investment; working within the confines of the immediate needs of industry can lead to short-term thinking. During this phase the TED researchers sought collaborations outside of the consortium project that could help create models for systemic change. The team worked with scientists and with new stakeholders in Asia to test the tools further and to extend the vision for the models for the Textile Toolbox exhibition.

The TED researchers – fashion textile designers – all gained an understanding that new visions for systemic change would mean **new collaborative approaches**. Design thinking was applied in science contexts to connect the global stakeholders of the future industry through new models. Similarly, the PhD practice research went outside of the norms of the accepted supply chain infrastructure to experiment with visions for **new socially beneficial, closed-loop supply chains**. Designers need to expand their vision of design to include imagining new 'disruptive' supply chains.

Extending this idea of collaboration, the TED designers sought engineering collaborations to find solutions to material and systems questions around cyclability.

Textile designers need to work in engineering collaborations to create new circular economy concepts.

Significantly for the TED designers and the stakeholders they worked with, the demands and challenges of the circular economy suggested new opportunities for education and training. The well-known idea of the 'T' shaped designer (Brown, 2006) became an 'I' as the team began to understand through action research and practice that gaining a greater knowledge of sustainability needed to be accompanied by a greater sense of the 'self'. Designers need support in understanding what they can do in design terms to move towards systemic change and a circular economy.

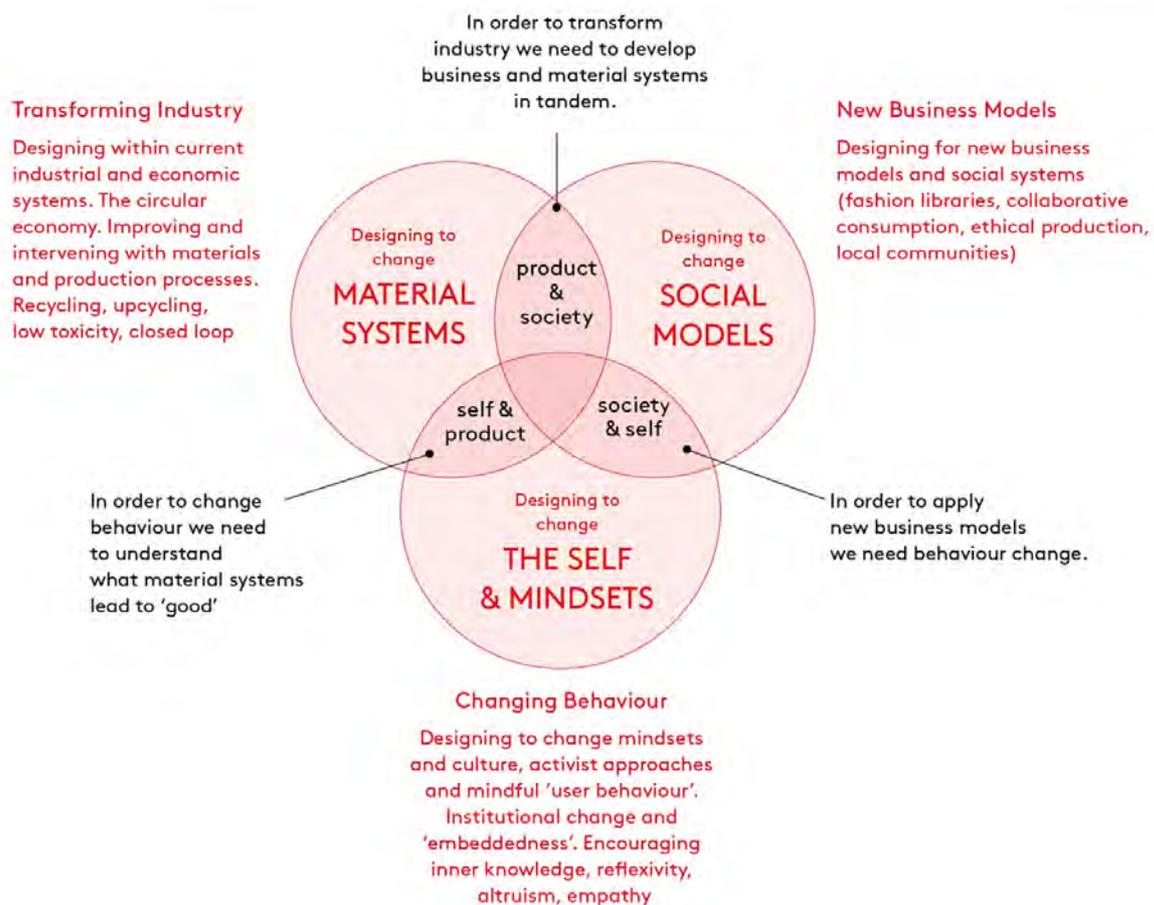


Figure 95: *Materials, Models, Mindsets* (Earley, Goldsworthy, Vuetich 2015)

The challenge of being both educator and maker gave the team the insight to create models for systemic change that extended the current practices of both fields. (Figure 95)

We arrived at this conclusion through the stakeholder workshops and exhibition curation process where design items were developed and/or selected to demonstrate:

Material systems concepts:

- laser technology, vertical manufacturing processes, and cyclability
- coding of materials to generate unified identification for enhanced cyclability in a closed loop chemical recycling system
- short life, carbon-low materials for fast recovery and repurposing for appropriate user behaviour in a high volume fashion context

New social models:

- using discarded Swedish fashion creating high-end upholstery and accessories when crafted by a network of cabin weavers
- designers who provide playful tactile tools for users, empowering them with democratic digital design approaches and emotionally durable products

The *shift in mindsets* needed for systemic transformation of the industry:

- The transition of design practice to an engagement with social issues is not simple, and designers will need guidelines
- Aesthetics and symbolism, combined with upcycled garments, encourage better consumption decisions made by young fashion users
- Upcycling and activist approaches help inspire, educate and support emerging fashion entrepreneurs
- Designers need to employ collaborative consumption and explore collective repair approaches

The exhibition curation process not only revealed these areas of focus for the future: product & society; society & self; self & product; and in the middle zone - product, society and self, but also the overarching dimension of speed. Understanding product speeds for fashion will enable designers to create appropriate garments in the industry of the future. This insight allowed the team to consider the connection of design for cyclability with systems and services concepts, forward-design thinking lifecycle planning, and with consumer interaction in their life-style. Designers need to understand product speeds along with design for cyclability.

5.4 summary - new design tools

Which tools can help stakeholders redesign and design products and systems for a more sustainable industry?

Tools were developed and used throughout all stages of the project. Although we had operated a project website throughout the duration of phase 1, in this final stage we redesigned the site to communicate these new design models, and share the tools that helped us generate the new insights. A project that needs to connect multiple

stakeholders, operate across several countries, and deliver a complex range of outcomes in a way that is accessible and appropriate, needs a dynamic website. We used the textiletool box site to build an audience from the outset, to garner feedback as the research progressed, and to have a constantly evolving platform to test our ideas. Web platforms can be used as a research tool: to experiment and test ideas; to invite and support collaboration; to build networks, communities and stakeholders; and to disseminate and communicate the outputs as the project work progresses.

The second key tool we developed was the set of TEN cards. The revision of the texts that provide guidelines for The TEN, the design and print of these into a new card format (September 2011), and later their translation into three other languages (Swedish (November 2013) and traditional / mainland Chinese, (October 2013), provided the team with a refined set of theoretical ideas to work with the audience. Translating the cards into Swedish and Chinese helped us to connect with stakeholders in very particular contexts during the project. Tools needed to be flexible and culturally relevant.

This process of continually reflecting on the theoretical framework for the project also gave us the insight to write animation scripts and direct the visualisation process with an animator, to produce ten short animations that make the design strategies more easily available and accessible. Used in conjunction with real-time training courses, the films increased the levels of understanding and interest amongst the stakeholders. Physical and digital tools are crucial for engaging stakeholders in discussions about design for sustainability and their business practices.

The research into current large-scale sustainable textile innovation for H&M - used in the training programme and for the 'Sustainable Design Inspiration' keynote lecture series - also gave new insights around what the New Development Team considered to be actionable ideas. The time coding exercise of physically stamping case studies revealed the level of existing knowledge amongst the designers, and also to what extent they thought change was possible. They were asked to stamp cases to be 'now' (up to two years away from market); 'near' (up to five years away from market); or 'far' (more than ten years away from market). One table of H&M participants also invented a 'never' stamp for cases that they believed would never be workable at the company. The relevant 'now' case study cards were taped to a wall to create a 'Now Wall' for the staff to peruse throughout the duration of the project. The *Now Wall* helped to embed the SDI programme ideas, enabling staff to see that sustainable design inspiration was part of their everyday work activities.

Whilst it was clearly exciting for the designers to get inspired by actionable sustainable design cases – from 3d printing to dematerialised products like the Muji ear bud or the Puma shoebox – we were aware that in order for ideas to reach the shop floor, we needed a tool to help the design team see that their creativity would be needed for another task: that of turning a barrier into an opportunity. *Barriers to Opportunities* tools, like the TED task poster for H&M, can help unlock creative thinking in a design team whose role within a company is restrictive.

The poster did indeed aid the design team to see that they had a role to play in the company, and that their research time on a Friday once a month could be spent

generating sustainable design ideas for the company more broadly than through products but what needed to be addressed was making a case for the 'return on investment'. For this, we needed to be able to prove that the redesign ideas really were better in environmental terms. We found that tools which enable industry designers to be creative with a full range of inspiring strategies for sustainability (The TEN), when combined with measurement tools (Higg Index), enabled practical reflection on redesigned products from an informed, scored, position. Designers can use measurement tools like the Higg Index to gauge the effectiveness of new design decisions.

At SFA, we used the TED worksheet together with the Higg Index to score products before the workshop began. We then had a day to work through The TEN strategies and make changes to the design of the product. The product was then rescored. Results showed a 3–41% improvement in Higg scores – most improvements were related to making the product more easily recyclable, although other scores were achieved through a change in material. It was noted that these design details were not tested in terms of performance, and that this would need to be addressed in future research. Yet making these changes real, as we have already acknowledged, is not straightforward. Designers need help in communicating the ideas to others within the organisation (terminology and language tend to differ between departments) and what can be achieved in the TED workshop is often hard to recreate once the designers are back in their own environment.

Internal communications are key to embedding sustainable design thinking in companies. We discovered that much more creative and playful formats could release designers from their inhibitions and open up conversations that perhaps the current infrastructure does not support so well. Ultimately this is about releasing and exploring the creative potential within the existing team, so that they can flourish and feed the company with insightful ideas. Designers in large companies need to be given creative tools to communicate internally about sustainability - across the divides between roles, departments, responsibilities and locations.

If we look at this from a social perspective (as the PhD researcher did) we can see that the challenges are greater than just language, and designers will need help in arguing the case for more socially responsible decisions being made elsewhere in a company. They will also need to understand their place in a changing industry landscape if social improvement becomes more important to them and their company. Designers need support and guidelines for making the transition to a socially engaged practice.

This raised the broader question about the people who need to drive changes through a company and its supply chain, those whose roles are to educate and guide. The researchers found that in this project a great deal of change was being asked of them, as well as their stakeholders. Throughout the project, consciously developing new skills and tools was considered essential and beneficial to all - especially within the new frame of 'society', 'product' and 'self'. Design researchers need special training to support other designers effectively, and in an inspiring and motivating manner. Training and tools can support textile designers in evolving a more mindful, innovative and connected practice. Making tools can be transformative for research, and for the researchers themselves.

The consumer was another stakeholder considered through this project and the design researchers explored ways to support changes within their habits and actions. The approach of developing new skills and tools was applied here too. As the project moved to its conclusion, the discussions around cyclability and the circular economy constantly raised questions about the role of the consumer in these future cycles, and brought us back to thinking about designers educating the youngest of consumers. Designers can develop tools to help consumers prolong the life of their wardrobe using simple domestic every day items.

Designers can also educate school children about sustainable materials, consumer habits and impacts, and develop tools to embed the ideas. The next generation of designers will need to be educated with a curriculum that offers a broader range of disciplinary perspectives on the industry. Education needs to change to prepare fashion textile designers for thinking and working in a holistic and empathic way, contributing to better products and social impacts.

6 implications for future research

We need to be able to work with designers in companies from both the 'top down' and the 'bottom up', supporting the use of the tools in different contexts. We also need to 'move sideways', bringing the user into the process, and the process to the user. This requires radical new visions for design, but also new business models. This sideways movement will demand that businesses initially work together in the 'race to the top.' Design education will need to reinvent itself as designers move away from products towards people and circular services. Designers of fashion and textile design need a wide frame of reference, which the educational curriculum has to reflect, and which exposes them to ideas and activities of other disciplines including sciences, sociology and fine arts. Multi-disciplinary collaborations with all kinds of experts will be invaluable for our future designers.

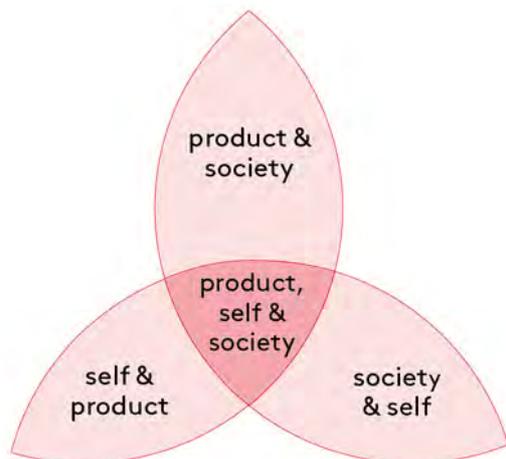


Figure 96: The central sections of the Material, Models and Mindsets Venn diagram (Earley, Goldsworthy, Vuletic, 2015)

Product, Society and Self (Figure 96)

The research resulted in the proposal of zones for future research, whereby the framing of issues within four contexts may guide the development of more top-down, bottom-up and sideways decision-making by a range of key industry stakeholders.

Product & Society - The fashion textile company's product and its performance in the workplace and social domain.

Society & Self - The fashion textile company and the relationship between habit, mindset and actions of individuals in the workplace/social domain.

Self & Product - The individual fashion textile designer and reimagining the product within the context of lifecycle design, habit and mindset change.

Society, Product & Self - The fashion textile designer reimagining the product; working for a company that has a strong social and workplace ethic; within which the individual has a platform/space for exploring the 'self' – leading to a greater empathy for others and socially as well as environmentally considerate design outcomes.

Table 16 (pp.140-141) maps out these themes in more detail.

	Product & Society (the fashion/textile company's product and its performance in the workplace and social domain)	Society & Self (the fashion/textile company and the relationship between habit, mindset and actions of individuals in the workplace/ social domain)
Industry Influencers (Directors of key organisations and departments, such as the Sustainable Fashion Academy (SFA) in Stockholm; the New Development Team (H&M); Professors at Konstfack University College of Art, Craft and Design)	<p>Sweden needs stronger links to a global supply chain.</p> <p>The great respect in Sweden for craft production and authenticity has an implication for social business models allied to technologies.</p> <p>Necessary development of viable alternatives to incineration of textiles – 'ReDesigning' or 'ReFashioning'.</p> <p>Research into new models involving indigenous materials such as cellulosics, latest technology such as use of laser and conductive features, to combine natural resources with emerging technologies.</p>	<p>Collaborative work – collaborations. Design and science collaborations and across disciplines.</p> <p>The courses being offered by the company to the individual designers – time to think. Friday time. How to use it more effectively to achieve change within the company through the workforce.</p>
Corporation Designers (Design/manufacturing/marketing/retail company design team members at H&M)	<p>More research needed on textile and fashion design knowledge and ability for designers to leverage design thinking at both product and company strategy level to effect change.</p> <p>Designers in large companies need to be in closer contact with overseas production and the consumer. Too few mechanisms for feedback to design teams.</p>	<p>Personal values play an important role in the individual designers in big companies – this needs to be given more of a voice.</p> <p>The ability to work more in mixed teams: see collective wisdom reference.</p> <p>Further research that explores the role of creativity in the transformation of worldviews /values.</p>
SME Designers (Graduate and professional designers and buyers working in SME's delivered primarily through a new module at SFA)	<p>Sweden leads the way with practicality, informality and simplicity. More examples needed of performance business wear that covers high tech developments for everyday clothing.</p>	<p>Working from the notion of the designer as a 'T' shape, and the proposal within the project that they should aim to be 'I' shaped, what new skills do designers need to meet the challenges of creating more sustainable products and services?</p>
Emerging Designers (Tutors and teachers, through collaboration with UAL and Konstfack; BA and MA design students, through projects within the curriculum)	<p>Emerging designers require an understanding of the relationship between the fashion industry and the product. They need to understand: industrial contexts, the activities of entrepreneurs and the influences of user groups; the role of PR, journalism and the Internet; the importance of collaborations, networks and services; the need for acumen in turning their design prototypes into new business models and the deployment of new technologies.</p>	<p>For emerging designers to have an active role in both cultural and economic spheres, they will need to understand the behavioural tropes and mores in current societies. In Higher Education, there is a need for an appreciation of social ecological and political issues, as well as the development of the material qualities in fashion. Also, the development of open, searching mindfulness, through collaboration and critical questioning with other disciplines where perspectives are different.</p>
Global Online Audience (Extended global audience of designers, researchers, students, consumers and educators)	<p>Research to make information transparent and accessible. Empowering people to make changes through informed choice – what to buy and from whom based on transparency.</p>	<p>A Swedish interest in early adopting of technologies, e.g. social media, has implications for consumer engagement and habit.</p> <p>Making sustainability the social default: How to make this happen through research.</p> <p>Making sustainability the social default: How to make this happen through research.</p>

Table 16: Recommendations for future research for stakeholders, themed by product, society and self

Self & Product

(the individual fashion/textile designer and reimagining the product within the context of lifecycle design, habit and mindset change)

Society, Product & Self

(the fashion/textile designer reimagining the product; working for a company that has a strong social and workplace ethic; within which the individual has a platform/space for exploring the 'self' – leading to a greater empathy for others)

Research into changing attitudes and behavior through design.

Game play and role-play was particularly beneficial in workshop contexts: more potential to explore here, particularly in engaging designers effectively and creating more adventurous ideas.

More research into the **leadership strategies within large organisations**, and building the knowledge and understanding around the **contribution that design research** can make. Ultimately the workforce is bound by their decision-making – how can we make it more enlightened and less risk-adverse?

Research that demonstrates a systemic and **socially engaged approach to design roles** in supply chain: future research could continue to prototype new design roles and methods that connect stakeholders in the supply chain, including design and CSR/ethical production strategies.

Further understanding needed on the relationship between **aesthetics** and **sustainability** in a large fashion organisation.

Tailored sustainability information is needed – **bespoke** for divisions of a large company – to be **digitally available** via a desktop icon for all staff.

(Sustainable) textile designer/maker practice demonstrating unique methods and qualities. More research needed on the unique methods and approach of (sustainable) textile designers and makers in a fashion context. Understanding the role of **Personal Meaning** and **Aesthetics** in sustainable textile/fashion design engagement. Further research needed into how to **articulate** and **communicate textile design epistemology** and knowledge in academic and design contexts.

Creative work flourishes in education through experience, knowledge and instinct, combined with experimentation and analysis. Design practitioners will best survive if they become **lifelong flexible thinkers**, able to learn from analogy as well as first principles. From their curriculum, graduates will need to achieve: a combination of **self-knowledge**, **technical knowledge** and a background of broader **intellectual skills**; the **core disciplines** including technical skills, knowledge of fabric qualities and appreciation of aesthetics; and to think in original, **game-playing**, **unconventional** ways to create interactions between the designer, the product and the user.

Networking to change behaviour – web platform, interactive, tools and workshop communities.

Research to connect more through **social media**.

Cyclability was an overwhelmingly interesting topic for designers in all contexts; **lifecycle thinking** enabled them to innovate of redesign of products. The strategy was easy to understand and applied by designers, and may lead to more readily working with other concepts.

Technologies to identify materials and develop material identification to assist **cyclable strategies**.

The textile designer as an under-used resource. Further research needed on 'textile designerly ways of knowing' and the usefulness in **socially engaged contexts**. More research needed on left/right brain framework to understand design/craft making through an inter-disciplinary lens of science and the humanities.

A systemic and socially engaged approach to design requires an understanding of values and worldviews. Further understanding needed of how values effect design behavior. Further research needed on the role of subjective values in employee engagement with Corporate Sustainability strategies.

How do we design for **cyclability** and proactively anticipating the **product lifespan** and **end of life options** within **mass manufacture** contexts?

Textile designers' role expanded into the **social realm**, within the scale of company where action is supported and invested in.

The smaller companies have the greatest motivation towards Design Activism – and this could mean **risk taking** and **disruptive design approaches**. Designers in SME companies should be supported in being **pioneers and mavericks** – breaking traditional molds for fashion and textile design – and using the agile nature of the SME company to profitably signpost new alternative ways forward for the whole industry. This could be fostered through more **research partnerships** between SME's, academics, and the sciences.

Sustainability has become an essential theme in the future design of textiles and the fashion system. It is an important link between anthropology, technology and an ethical perspective. Key issues are: **forward design** of materials and products, ensuring a sustainable, efficient 'circle of use' where material content is recovered to become a continual loop; development of '**closed**' and '**open**' loop potential of fashion fabrics; the need for a combination of strategies and technical skills required by networked designers who become **change-agents**; and sophisticated focus directly on identifying problems and **overcoming barriers to sustainability** in the fashion industry.

Future research to emphasise **personal relevance** to sustainability for **consumer**. Research to explore further and make people aware of this.

From the Textile Toolbox survey we found that the global audience sees the most **inspiring design research innovations** are material and technical, yet might ultimately be focused around **reducing the need to consume**.

Speeds, Contexts, Lifecycle and Compromises

Circular can be fast or slow - Through examining these results – specifically the exploration of the 10 approaches to designing for circularity (pp.93-114) - we noticed something intriguing. As expected most of the approaches were looking at ways to extend the use phase of the product (in both physical and emotional durability strategies) whilst three of the prototypes had little or no reference to product longevity and were rather concerned with easing the flow of materials back around the lifecycle, creating garments which were designed for a particular material-recovery technique or even intervened with the material at the actual point of recovery itself.

Context is everything - Another important factor is the 'context' of the garment and appropriate choices based on specific 'archetypes'. Not all garments are the same and what makes sense for a basic white t-shirt may not be equally beneficial in the design of a coat, a piece of underwear or a hospital gown. In closer examination of the scientific (LCA) results from project 4 of the Mistra Future Fashion work, we could see that impacts across all stages of the lifecycle are very different for these different product archetypes and there simply isn't a solution which would suit all equally.

Circular Speeds inter-relate to ALL areas of a product's lifecycle - When we look more closely at time and speeds across the whole lifecycle of a product we can see that it can apply to all of its lifecycle stages, not just production and use, as is usually the case. The seemingly opposing ideas of extending the lifecycle against reducing it are more connected through the nature of the cycle. Often it might simply push the impacts from one part of the cycle to another. For instance if the materials needed to create a durable product are more impactful in production, or if the laundry requirements of a longer-lasting product are more impactful and if the materials are ultimately not closed-loop (or recoverable at a high level) then the difference between a long-life product and a short-life one may not be that dramatic in real terms. If you keep something for a long time and never wear it, then you are likely to be buying more items to plug that gap in your wardrobe anyway.

There are trade-offs between durability and recyclability - There are often compromises between designing for durability and recyclability which make it difficult to choose one over the other. Some items require functionality which automatically increases impacts in other parts of the lifecycle, be it energy in material production to produce a hardwearing fabric or fibre mixes to achieve a low-laundry solution or even use of chemicals for ultimate advantage.

what next?

During 2017 we will be again exploring these ideas through a series of design concepts and prototypes. We are working with material and environmental scientists within the Mistra Future Fashion programme as well as embedding ourselves in an industry context through a series of 'design researcher in residence' workshops with Filippa K. These workshops will aim to develop market-ready prototypes alongside our research and offer new insights to the field of Circular Fashion. The final work will be exhibited in 2018.

Some of the research questions and insights that arose are being used to propel new research projects, and also provide the starting points for BA, MA and PhD student projects at Chelsea College of Arts and beyond.

Follow our progress via our project websites, and do get in touch if you would like to discuss any of these results with us.

www.tedresearch.net

www.mistrafuturefashion.com

www.textiletoolbox.com

appendices

pp.156–218

appendix 1: case studies	156
case study 1 - student electives and feedback	156
case study 2 - SFA workshops and feedback	169
case study 3 - H&M workshops and feedback	177
appendix 2: tables & figures	186
appendix 3: project bibliography	190
appendix 4: project logistics	196
summary of reach & dissemination activities	196
outputs and dissemination record	198
key performance indicators	209
project credits and report review process	212

appendix 1 – case studies

case study 1 - student electives & feedback

Konstfack University College of Arts, Crafts & Design, Stockholm, 2013-14

Team and Participants

Rebecca Earley, Kay Politowicz, Kate Goldsworthy. TED contributors to MISTRA Future Fashion (Project 3)
20 MA Students at Konstfack University College of the Arts, Crafts & Design, Stockholm, Sweden

Brief

Interconnected Design Thinking is a practice-based, design-led research project, in which students are offered a range of 'entry points' for positive, research-led engagement from the practical to the idealistic.

It offers a system for the huge and complex issues to be developed through a form of design thinking, into more manageable elements. Students are encouraged to develop a personal manifesto, which will take as its context the systemic problem of global ecological, social and economic crises.

The 5-week Elective encourages a reflection on personal practice and a methodology to re-frame the making of work. Written reflection and creative writing underpins design practice, resulting in a transformed approach, which is mindful of the wider contemporary context.

Structure

- We aimed to offer an appreciation of the product's life-cycle, as key to understanding how to design to improve its impact in material, social and economic contexts.
- We aimed to transform the theories of sustainability into actions - by applying the to the questions that artists and designers are asking today.
- Completed an Interactive Mapping Exercise: By drawing a map of Sweden in Europe for student identities. Where are we all from? Why are we here? What are your reasons for doing an MA? Why at Konstfack? How's it going?

Students:

- a) Re-wrote their 'personal practice statement' as a 'research question' following a two-day workshop.
- b) Prepared a Pecha Kucha presentation of 20 images to chart a physical and philosophical journey in producing work. (20 images to capture thought; work in progress; new experiences; influential encounters + 20 spoken captions to accompany the images with written, 'creative reflection')
- c) Prepared a design brief in progress to re-frame the making of work in the light of a personal manifesto.
- d) Completed design development towards a final piece/collection of work for the end of the Elective.



Figure 97: TED Elective with Konstfack students (2013)

Workshop 1 - Creative Writing Task

Students:

- a) Presented a poetic vision of the work concisely and elegantly through writing a text in as few lines as possible to illuminate personal feeling about the 20 images of the Petcha Kucha 'Narrative Journal'
- b) Adopted a satirical, ironic or diabolical tone.
- c) Used the words to reveal inner motives or confessions as a mirror to reflect their work.
 - Writing a terse news story to express the 'Project Title'
 - Writing addresses and messages onto a blank postcard format and then sending it. Using the postcard to generate story ideas.
 - Writing about their project as if THE WORK were telling its story, to express its feelings.
 - Writing as if a piece of crime fiction – as if to uncover the work as evidence at the 'scene of the crime'.

Workshop Task 2

Students:

- a) Presented a favourite garment from their wardrobe and identified to the group the qualities in it they valued
- b) Presented a garment never/hardly worn and the reasons why
- c) Participated in 'group discussion', to identify factors surrounding purchase, desirability, utility and aesthetics of clothing.

Workshop Task 3

Students:

- a) Described studio practice (to a partner). Listed 5 key words to summarise
- b) Presented a statement to the group.
- c) Discussed and wrote a summary of content for each project on wall.
- d) Elective Blog Proposed on 'Textile Toolbox' (TED MISTRA blog). Images of workshops and work in progress were then posted with commentary.
Pecha Kucha presentation of 20 images, in a 7 minute 'Narrative Journal' to chart a physical and philosophical journey in producing work. (20 images to capture: thoughts; work in progress; new experiences; influential encounters + 20 spoken captions to accompany the images with written, 'creative reflection')

Workshop Task 4

Students wrote a personal TED Code:

- a) Identified TED Strategies relevant to the work. (TEN hand outs)
- b) Identified TED strategies relevant to the practice statements, making a 'personal code'.
- c) Present individual codes / feedback for group discussion.

Workshop Task 5

Students:

- a) Using the TED models as a guide, identified a question from their practice.

- b) Listed the potential barriers to developing this successfully.
- c) Feedback to the group.
- d) Template (provided) to make a Research Statement into a Research Question and then into a Design Brief to address the research question.

Workshop Task 6

Students:

- a) Analysed + discussed a 'Favourite Garment'.
- b) Described the qualities that made it so special – universal and personal.

Workshop Task 7

Students:

- a) Prepared an individual Manifesto.
- b) 'Declared' the manifesto to the group – with a verbal Identification of barriers/challenges, which needed to be overcome.
- c) Discussed + presented barriers to the group
- d) Design development of 'Narrative Prototypes' in the studio as a Manifesto in Practice & Design Brief to re-frame the making of work in the light of a personal Manifesto.
The presentation of a method to locate the issues at the heart of practice and develop a design brief by converting it into a question, which will be answered through making work. 'Question Coding' presentation uses models to demonstrate the barriers/ challenges and solutions in design outcomes.

Individual Manifesto & creative writing as a mirror to reflect on personal work.

Workshop Task 8

Students:

- a) Participated in a 'Black Hack' workshop to enable design and production of an up-cycled shirt using sublimation technology.
- b) Imagery relevant to personal objectives and group discussion to locate project ideas within the wider professional context of sustainable design.

Workshop Materials

Disruptive Innovation Barriers

Aim: To create mindsets which welcome the uptake of innovation in business.

Objective: To focus not on the problem – but on overcoming the barrier to achieving the solution.

Action:

1. **Identify the problems.** eg – cheap, fast fashion = polluting waste. What can be done to reduce it?
2. Identify the **barriers to solving** the problems
3. **Treat the barriers as problems.** – Who is causing the waste? How can waste become valuable? Where are the waste mountains? What is the composition of them? How can they be mined? What can be developed to use the waste again? Can the waste become raw material? Who could benefit financially? Can legislation be a carrot/stick? Whose mind-set needs to change to see the potential advantage? What can technology bring? How can production continue without adding to the problem? What else can take its place for profit?
4. **Take the new problems and identify the barriers to solving them.**
eg How can waste become a raw material? – How can garments be kept in circulation for the longest time? How can the garments be up-cycled? How can the material they are composed of be reused for the most profitable output? How can most of the material be recovered profitably? How can the material content be fully recovered and feed a continuous loop?
5. Take one of the new problems and treat the barriers as problems.
eg. How can the material content be fully recovered and feed a continuous loop?
Can the original design forward-plan the recycling process? Can the garment be dis-assembled? Can the content be monomaterial? Can mixed fibre content be separated for recycling? Does a fabric coating inhibit recycle processes? What is the energy/water/cost of recycling the material? Can the processes required be sited together to make effective business sense?
6. **Develop questions into design briefs**

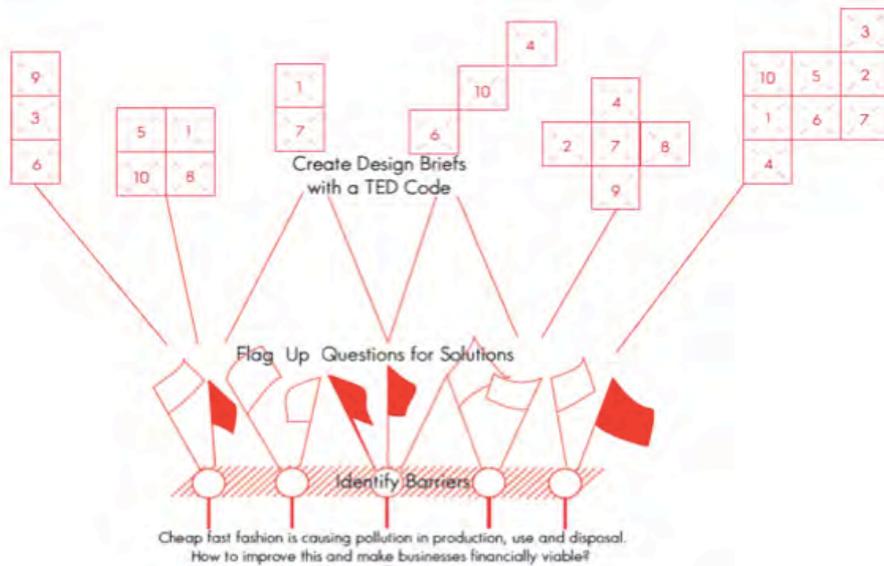


Figure 98: Question Flagging technique, adapted from Idenk

Creative Writing Brief

Creative writing is any writing that goes outside the bounds of normal professional, journalistic, academic, or technical forms of literature, typically identified by an emphasis on narrative craft, character development, and the use of literary tropes. Due to the looseness of the definition, it is possible for writing such as feature stories to be considered creative writing, even though they fall under journalism, because the content of features is specifically focused on narrative and character development. Both fictional and non-fictional works fall into this category, including such forms as novels, biographies, short stories, and poems.

- Begin with some form of sensory experience. This tangible prompt creates access to a source of memories, associations, feelings and ideas.
- The writing process allows a new understanding of your work and this can be both illuminating and moving.
- Through creative writing, as an artist, you could make new connections and identify new themes in your work.
- The writing process could offer a new expressive voice with which to crystallise emotions previously unarticulated.
- Explore the sensual and conceptual journey of your work, using creative writing as a vehicle for discovery and communication.
- Use creative writing to depict, explore and extend awareness of your work.

As a tool:

- An expressive tool with which to document your process and talk about your practice.
- An intuitive tool that can illuminate unseen features of a work and can enable new perceptions of the subject and yourself in relation to your subject.
- A dynamic tool that can assist in the evolution of a work and/or create conditions for new work to begin.

Quotes

"A tittle is an extra colour for the palette" Marcel Duchamp

"A picture cannot depict its pictorial form – it displays it".

"Language disguises thought." Ludwig Wittgenstein, Tractatus Logico-Philosophicus

Historic Example

“Nouvelles en Trois Lignes” “News in Three Lines” or “Novels in Three Lines” . France 1890 - an art form instigated by Feneon – terse newspaper prose.

Félix Fénéon was a Parisian anarchist and art critic during the late 1800s. He coined the term "Neo-impressionism" in 1886 to identify a group of artists led by Georges Seurat, and ardently promoted them. He sheltered wanted anarchists, edited anarchist journals, may indeed have set a bomb himself (although the evidence against him is highly circumstantial)—and did all those things while employed as a clerk in the Ministry of War.

The Fénéon Prize was established in 1949 by his wife based on proceeds from the sale of his art collection. He was described by Luc Sante as being ‘Invisibly famous’.

‘Within a week, a second case of bigamy has been recorded in Bordeaux, that of a laborer's wife who has become a foreman's’

‘A merchant from Saint-Gaudens caught his wife entwined with a barber in Boussens. He fired. The lover was wounded, the beloved fled.’

‘Standing on her doorstep, modiste Rudlot, of Malakoff, was chatting with a neighbor. With an iron bar her wild husband made her shut up.’

Not what SHOULD it be? But what COULD it be?

Not a dull account Not a manual Not predictable ...BUT possibly:

A poetic vision of the work. - A revelation of inner motives - A confession.

Display your feelings about your work and what you hope it conveys.

You may wish to be satirical, ironic or diabolical.

Concise and ‘elegantly sufficient’.

Creative Writing Task

- Write a personal text in few lines to illuminate your feelings about the 20 images of your Petcha Kucha ‘Narrative Journal’.
- You couldwrite a terse news story to express your ‘Project Title’
- You could write addresses and messages onto a blank postcard format and then send it. Use the postcard to generate story ideas.
- You couldwrite about your project as if YOUR WORK were telling its story, to express its feelings.
- You could write as if piece of crime fiction - to uncover the scene of the crime.

TEN Strategic Questions to Interrogate Your Practice

1. Design to Minimise Waste

How to reduce the many kinds of waste created within the textiles industry, both pre and post consumer?

Assess the potential forward impact of design choices/decisions, on production use and eventual disposal of textile products. Create a design narrative in response to a life-cycle analysis of the product.

- Can any of the materials included in the product be reduced?
- Are any virgin materials replaceable with recycled (economically/practically)?
- How much waste is incurred at each stage of production?
- Is there a way of minimizing the waste through redesign at each stage?

2. Design for Cyclability

How to up-cycle existing garments and how to design with virgin materials, in anticipation of future recycling?

Anticipate the potential for eventual recycling and re-purpose textile product in the initial design process. Existing garments or products are considered as raw material, ready for added value to be applied.

- Identify the difference between recycling and upcycling.
- Can you identify the total material content of the product?
- Can the product be reused, repurposed or disassembled?
- Can the product be mono-material or closed-loop?

3. Design to Reduce Chemical Impacts

How can the use of harmful chemicals at every stage in the life of the product be reduced by design? Select the most appropriate material selection and processes for any product, to minimise the environmental impact.

- What is the chemical impact of your product on the environment?
- Are there any alternative production processes to minimise impact?
- What are the latest technical developments in this field?
- Are you aware of any assessment tools to evaluate impacts?

4. Design to Reduce Energy and Water Use

How to conserve water in the production and use of textile products?

Evaluate the ways water and energy are consumed in the processing of textiles. Design out the heavy carbon footprint, particularly in consumer laundry.

- What are the water and energy impacts of your products?
- Are you designing to reduce water and energy use to a minimum in the *production* stage of the product?
- Are you designing to reduce water and energy use to a minimum in the *use* stage of the product?
- What improvements can you identify as significant in this area?
- How can you create awareness of this topic in the customer?

5. Design that Explores Cleaner / Better Technologies

How can technology be used to make more sustainable textiles?

Design for new technologies to save energy and materials. Reduce environmental damage in the production of yarn and fibre, the construction of fabrics, dyeing and finishing of products.

- Are there any alternative production processes to minimise impact?
- What are the latest technical developments in your field in materials or processes?
- What are the barriers to your uptake of new processes?
- How can you design to improve the product and make it desirable for the customer?

6. Design that Uses Models from Nature & History

How can the practices of the past and models from the natural world inform textile design and production of the future?

Seek design inspiration, information and solutions from studying the textiles, habits and societies of the past. Seek models from the natural world to inform textile structures and material qualities.

- Are you aware of biomimicry as a model for making new products?
- What are the benefits/challenges of nanotechnology?
- Are there any systems in nature that you believe could be/are models for the development of a product?
- Can the design of your product benefit from historic practices?

7. Design for Ethical Production

How can design encourage, promote and maintain craft skills, locally and globally?

Ethical production supports and values people and sources materials fairly. Designers can act as facilitators of sustainable and social enterprises - both within traditional craft communities and in partnerships with new technologies.

- Are you aware of the ethical issues surrounding all stages of your supply chain?

- Are there any concerns around material sourcing and worker's conditions?
- Do you have a CSR policy?
- Have you heard of Corporate Social Innovation (CSI)?
- Do you facilitate any enterprises in craft communities?
- Are you aware of any ethical organisations?

8. Design to Reduce the Need to Consume

How can designers make stuff that lasts, that people want to keep and look after?

Textiles products can be designed and produced to adapt and improve with age. Reduce shopping by designing creative social experiences; the customisation of clothing and textiles; for a DIY culture.

- How long is your product designed to last?
- What is your evidence for the lifespan?
- What are the conditions in which that would be maximised?
- What systems could be developed to improve the longevity of the product?
- What happens to the product at the end of its life? Why?
- What is the feedback from customers and how is that facilitated?
- Why would consumers participate in customising/ personalising products?

9. Design to Dematerialise and Develop Systems & Services

How to develop the concept of designing services that support products?

Employ a design strategy to develop services that are designed to support products in the encouragement of on-line/ local communities of consumers to lease, share and repair.

- Is there a service associated with your product that could be part of your brand identity?
- How is/would that be developed?
- Can you propose to design an experience to connect consumers with each others/and or with your brand?
- Can you source/propose local activities to enhance consumer satisfaction and social engagement?

10. Design Activism

How can designers extend their effect beyond the product to work creatively with consumers and society at large?

Textile designers become social Innovators, using their design skills to meet social needs. Design events and communication strategies to increase consumer and designer knowledge about the environmental and social impacts of textile products.

- How can you improve consumer awareness of environmental issues through your brand?
- Can your product act as agent for better environmental practices?
- Can your product be designed to add to social innovation?
- What resources would be necessary to make the consumer an active participant?
- Are you involved in publications/ exhibitions/ conferences/ festivals/ blogs/ open-source networks?

Zines



Figure 99: Otto von Busch, Zine Production 2013

Outcomes

MISTRA Future Fashion funds contributed to the teaching programme, to provide a framework for a variety of approaches to sustainable design thinking. TED research staff (MiFuFa Project 3) designed and delivered the Elective and provided feedback to the students and Konstfack as a College. (The programme content was previously piloted 2011-12 with UAL MA Textile Design students.)

'Interconnected design Thinking' was one of eight Electives offered to MA students across all disciplines at Konstfack to 11.25 % of the total cohort. (A cohort of 80 students in total). Student Elective Group comprised:

- 77% (7) Textiles in The Expanded Field
- 11% (1) In Space Interior Architecture & Furniture
- 11% (1) Art In the Public Realm
- 100% of Registered Students Completed the Course.

Students:

- Attended TED presentations & follow-up discussions (Total 8)
- Participated in quality in-depth immersive workshops (Total 8)
- Identified area of individual practice via presentations
- Wrote a personal Manifesto
- Presented a visual argument in 'Pecha Kucha' format
- Developed a piece of creative writing
- Attended a personal tutorials with the TED team (Total 27)
- Presented individual studio work relevant to THE TEN strategies
- Participated in evaluation process & peer review (Total 9 x 1:1 Reviews+ 4 Group)
- Presented evidence of transformed practice in sample form
- Demonstrated a sustainable transformation of personal practice.
- Contributed individual manifestos to a compilation 'Manifesto Zine'
- Contributed to a discussion to develop next year's Elective to ensure relevance.

Ida Pettersson

"I think that the elective for me was very much a starting point for how you can write more personally around your work, describe it in a more poetic way, looking at it from a different angle. The manifesto also gave me time and tools to really think about what the most important aspects of it are. Writing sometimes feels hard but the elective enabled me to think about how to make it into something useful. "

Ida Pettersson



Figure 100: Ida Pettersson

"The Ground is Not Level: Modern Patchwork" Textile interpretation of kinetic painting, using textile waste, meticulously collected and stored as a discipline. Offcuts progressively used in increasingly smaller constructions.

TEN Strategies

1. Design to minimise waste
2. Design for Cyclability
6. Design that uses models from Nature and History

MANIFESTO

- I want the search for a clear balance between color and repetition to be the basis of my practice.
- I want to feel secure of the work I produce and keep away from complicating things. Don't chase a field or thoughts that seems to be more interesting than mine. Stay where I am and develop further.
- I want my work to speak clear and an explanation in words to be unnecessary.
- I want to give away a physical and psychological experience, like when the mind is given something that effects your body.
- I want to hold on to the thought that patterns are interesting to repeat.
- I want to create something new with the inspiration from old textile handicraft to keep up the pattern of repetition and because borrowing from old techniques feels easy and easy keeps me focused

"This is my life
I am sitting in a car
the car is going north

on the way to a place I have never been before
the sky is white
the road is white
I can feel the white all over
But underneath everything has a color”

I collect the scraps from the cutting and am building a pile of them. I haven't come up with a great idea how to let them lead the way to make new patterns yet. So I am continuing my ordinary patchwork method but with a more aware mind from now on.

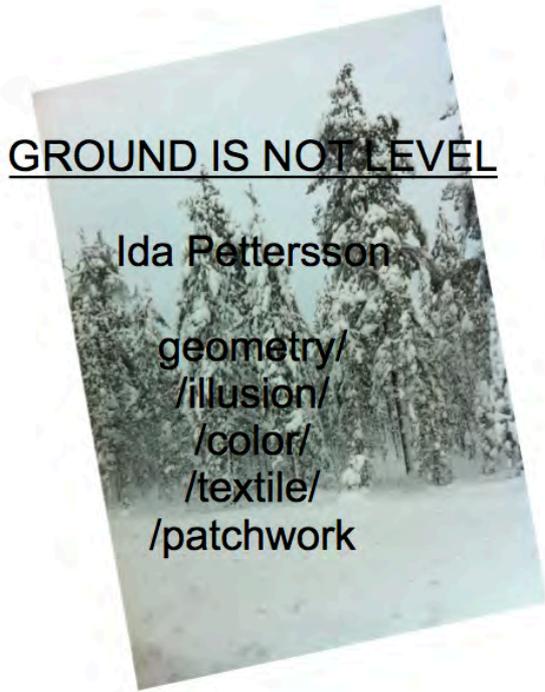


Figure 101: *Ground is not Level*, by Ida Petterson

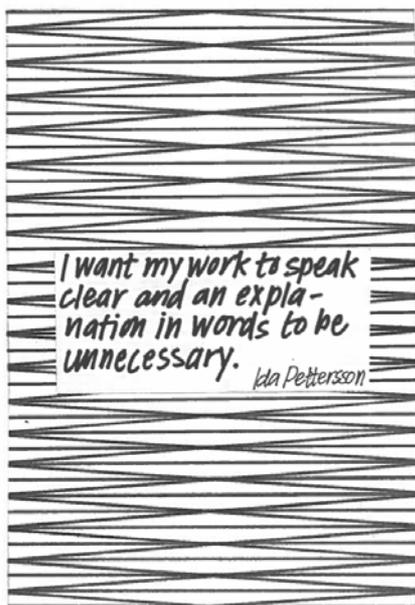


Figure 102: *I Want My Work to Speak Clear*, Ida Petterson

Lisa Axelsson



Figure 103: Sketches from the Treehugger Capsule Collection



Figure 104: Lisa Axelsson at her desk and her manifesto

“Serious Play” Conveys the serious message of sustainable fashion via playful interventions. Garment range employs subtle manipulation of the consumer via subliminal messages in the garment construction and references from trees.

TEN Strategies

3. Design to Reduce Chemical Impacts
8. Design to Replace the Need to Consume
9. De-materialise & Develop Systems & Services
10. Design Activism

“It is a capsule collection of garments knitted in Linen yarn. When hung on the wall the outfit will look like a tree. When worn, you won’t see the tree. The collection is presented through images or a film. These are really important parts of the work.”

Matilda Dominique

“My experience from last years elective course was very positive! Teds Ten was an inspiring, tangible tool to work with and I felt that the course opened up for unconventional ways of discussing what sustainability in the textile field can look like. Also, the tutorials and group sessions really helped me to push myself further with my work and the lecturers were very dedicated and inspiring. ” Matilda Dominique.



Figure 104: www.matildadominique.com

“Talking Threads”: Sample weaves are seen as a dialogue between materials, animated to comment on their identity, experience and condition. Communication is THROUGH the work and FROM the work. Materials are informative and communicative. “Talking Threads” is an exploration of methods that can enable an awareness to be created about the provenance of materials and start up discussions around issues concerning textile production.

By giving the materials their own voice I'm hoping to add emotional value to the fabric, which in turn enables the user/viewer to experience the material in more than a visual way.

TEN Strategies:

- 1.Design to minimise waste
- 8.Design to reduce the need to consume
10. Design activism

MANIFESTO

- Investigate through the process of making
- Explore new and old materials
- Let the materials tell their story
- Create experiences for many senses
- Challenge known methods



Figure 105: Talking Threads sample by Matilda Dominique

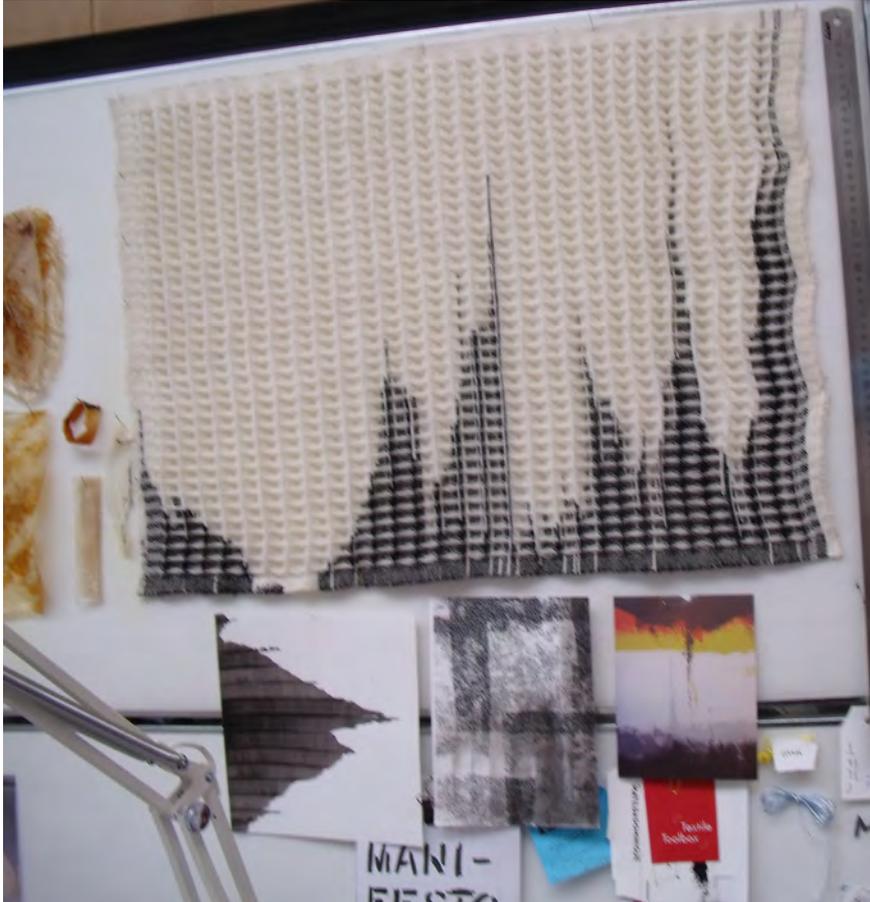


Figure 106: Talking Threads sample by Matilda Dominique

case study 2 – SFA workshops & feedback

Deep Dive in Sustainable Product Design at the Sustainable Fashion Academy, May 2011 – November 2014

Team & Participants

TED P3 researchers, Rebecca Earley and Clara Vuletich

- Total Project 3 SFA workshops: 4
- Total Swedish and Danish brands: 29
- Total participants: 104

Main Findings SFA Workshops: Earley (2011-14)	Target audience and value for user:
<p>Between 2009 – 2014 Earley worked at SFA in Stockholm and Copenhagen, helping Swedish and Danish brands redesign their products whilst continually testing and refining THE TEN. The short one-day training format of the workshops achieved direct results using the workshop tools.</p> <p>The 2013 SFA workshop offered a ‘Deep Dive in Sustainable Product Design’ and used the Higgs Index to help companies score their redesign concepts. During this Redesign Workshop concepts improved performance within range of 3% - 41% using the Higgs tool to measure.</p> <p>Earley has now used The TEN with designers from 29 Swedish and Danish brands including Kappahl, Lindex, Filippa K, Haglöfs, Åhléns, H&M, Houdini, and By Marlene Birger.</p> <p><u>SFA / Stockholm</u> – 81 participants in total June 2012 May 2013* November 2014 * <u>Brands:</u> 1) Kappahl, 2) Lindex, 3) Filippa K, 4) Boomerang, 5) Björn Borg, 6) Haglöfs, 7) Åhléns, 8) H&M, 9) Klättermusen, 10) Brunton, 11) Tierra, 12) Fjälräven, 13) Primus, 14) RNB, 15) Houdini</p> <p><u>SFA / Copenhagen</u> - 23 participants in total Sept 2011 <u>Brands:</u> 1) Only, 2) By Marlene Birger, 3) Inwear, 4) Bianco Footwear, 5) Designers Remix, 6) Modström, 7) Henrik Vibskov, 8) Baum und Pfergarten, 9) Tusnelda Bloch, 10) Aymara, 11) David Andersen, 12) Fnubbu og 13) The Baand</p> <p>Total Swedish and Danish brands: 29 Total participants: 104</p>	<p>Swedish SME’s</p> <p><u>Workshop Participants (Nov 2014 only):</u> Karin Kinander, Haglöfs Anna Oreman, Haglöfs Jenny Kjellbom, Haglöfs Catherine Stiller, Peak Performance Lena Claesson, Peak Performance Felix Lindström, Tierra Shamik Neogi, Tierra Emelie Carlsson, Lindex Jenny Andsberg, Lindex Lena Torn, Lindex Lina Karlsson, Åhléns Johanna Bjorck, Åhléns Sandra Persson, H&M Aspar Karahyuseinov, H&M Annika Wallin, H&M Cecilia Hammareb, H&M Carola Tembe, H&M Karin Segerblom, Filippa K Louise Akerlund, Filippa K Marita Lidberg, Filippa K Linda Hedström, Svenskhandel</p>

Table 17: SFA workshops audience

Brief

The overwhelming opportunity for sustainability in the fashion industries is that of innovation in connected thinking at all stages of the 'cradle to cradle' environment. Textile and fashion designers need to be trained to think and create in a full range of sustainable design concepts, and be able to combine complex technical techniques together with new materials and processes, along with product design ideas that improve the design, use and disposal potential of the product.

To embed these design strategies into companies' strategic approaches are needed: which are both highly creative, encouraging new connected thinking that leads to sustainable design innovations; and which enables the company to evaluate the design thinking, finding ways to make use of the innovative ideas quickly and economically. The Higgs Index can help design teams measure a products' environmental performance – and when fused with TED's 'The TEN' – it can also help to trigger new product concepts.

These workshops will focus on the pre- assessment, re-design and re-assessment of a product, using The TEN and the HIGG Index. This first workshop asks the participants to do some homework – the pre survey – and then takes the group on a creative redesign journey. The second workshop will use the Higgs tool to measure the 'improvement by design'.

Structure

9.30	Introduction to the course, introduction of the participants, roles & rules etc
9.50	70-minute session: 10 mins Presentation – Introduction to TED's TEN and the team 40 mins Task 1 - Draw your garment, pick a question card, answer the question for the group, feedback 20 mins Presentation - TED's The TEN 3&4
11.00	<i>+++ Coffee / stretch (15 minutes)</i>
11.15	45-minute session: 20 mins Presentation - TED's The TEN 1&2 35 mins Task 2 - Design Thinking & reworking the product
12.10	<i>+++LUNCH+++ (50 mins)</i>
13.00	90-minute session: 30 mins Feedback on the task 20 mins Presentation - TED's The TEN 5,6,7 40 mins Task 3 – New ideas inspired by technology, nature, history and ethical considerations
14.30	<i>+++ Coffee / stretch (15 minutes)</i>
14.45	60-minute session: 10 mins Presentation - TED's The TEN 8,9,10 25 mins Task 4 – Thinking about the consumer, systems and services and activism ideas 25 mins Presentations to the group of the redesigned product
16.00	15-minute session: 15 mins After Action Review
16.15	Wrap up
16.30	End

Outcomes

TED provided the PowerPoint presentation materials for the TED's The TEN, and cards for each table to use as prompts. Cards were available in both English and Swedish.

TED provided the printed A2 worksheet for the workshop, which formed the basis of the written record for the workshop (fig x).

TED also provided green question cards.

TED conducted an after action review at the end of the workshop.

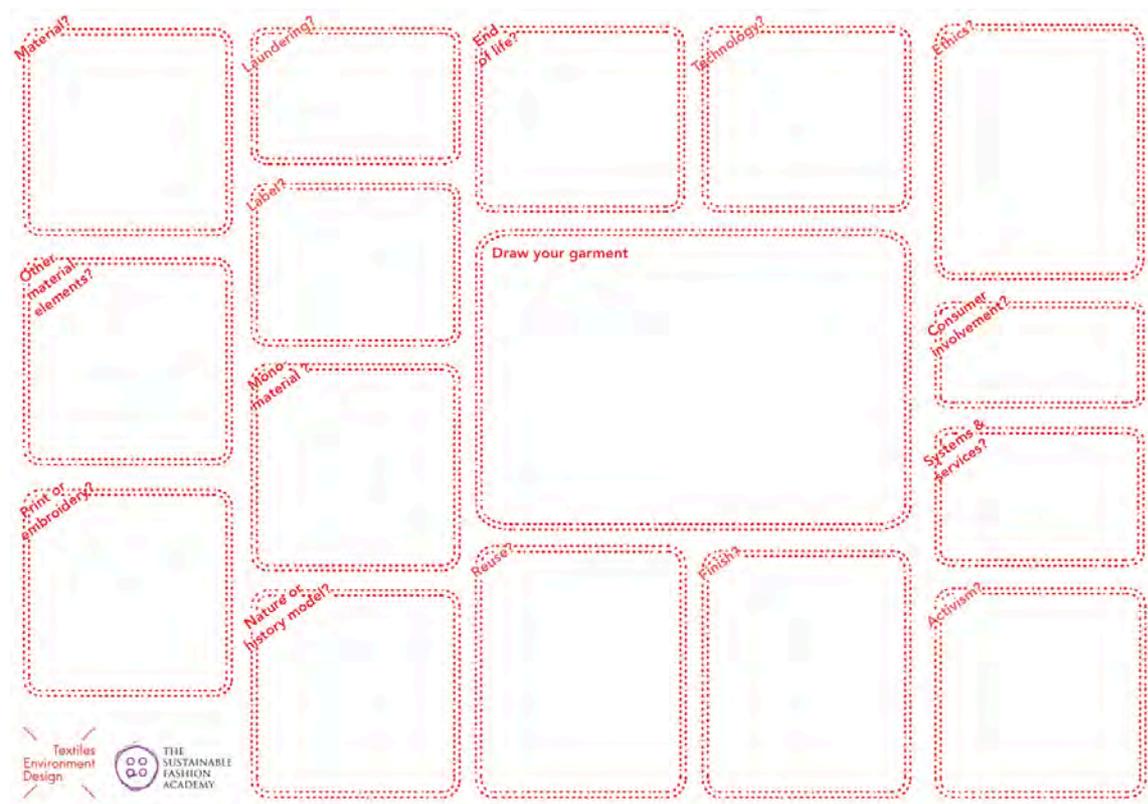


Figure 107: Garment Redesign Sheet for SFA workshops

23 products were redesigned during this period, with a Higg Index improvement score ranging from 1% - 41%.

Feedback

After Action Reviews (in room feedback forms)

These were completed by participants at the end of each session, and took less than 5 minutes to fill out.

Participant	Usefulness, score /10	Workshop design and running /10	Best thing about the workshop?	What could have been different?	Key message to others in the company?	Confidence about this leading to change in the company?

1	7	6	-	-	How much we could do	Quite
2	8	9	Becky's talks	More info on how we can work in a low price market	How to use design to make a change; it's not all up to the buyer	Quite
3	10	10	Exchange of ideas and knowledge; inspiring content and themes	Longer, and more open discussions	It's an event that should be attended; I will share the ideas and information	Confident to push team to more sustainable processes
4	9	8	All the new possibilities and ideas; teamwork around garment	A lot of info in a short time to take in; need the slides to read more (<i>note - they were provided</i>)	The TEN; all the new ideas going on	Much confident; we are already discussing this internally
5	8	8	Learning to think a bit outside the box; thinking about what can be done after the product has been with the customer	The big sheet was difficult to fill in at first	Go and check the websites	Quite confident
6	10	10	Meeting other brands; the presentations were great – without it, it's hard to now where to start	That I would feel more relaxed talking in front of people ;-)	Great workshop; there is a lot more to learn about how we make a product sustainable	70% - most people want to make a difference but some are to change
7	7	9	Free discussion around the Green Question Cards	Shorter presentations – more discussion	That their work will feel more interesting the more they know about sustainable issues and realise their power to change things	Not confident at all. H&M need to merge the sustainable department with the design department
8	9	8	All the info is so useful but I want to dig deeper	More days with even more info. There is so much more to learn!	That we need more knowledge and information in our company	Honestly, not so confident, but I will fight for it!
9	8	7	Inspiring examples and insights	More time on cases and for discussion	Great workshop	Pretty confident

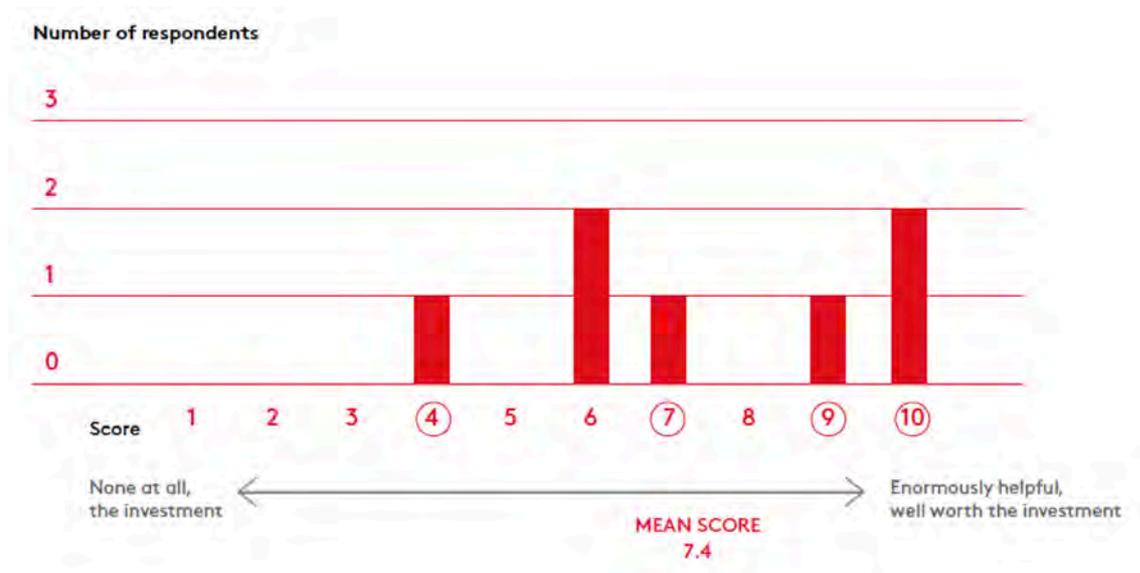
10	9	10	All the dimensions	-	It's always possible to improve	9/10
11	9	6	Creative ideas in terms of what's happening in the industry	-	Encouraging words for the one day course	8/10
12	10	10	Informative – getting the overview and the ability to pick stuff to go deeper into	Some reading before hand	Beneficial	Very
13	8	8	Becky! So interesting and inspiring!	Longer – to find out more about how particular materials have an effect on the environment	New ways of thinking around materials, ways of designing products	It will definitely effect my thinking!
14	9	9	Getting to know more about sustainability	More time – there is so much more I need to know about	Will do a PPT and inspire my designer colleagues	Very confident – small actions to inspire change
Av	8.64	8.42				

Table 18: Results from the After Action Review Sheets

QUESTIONS and ANSWERS: SFA Post Workshop Survey (March – May 2015)

Idenk were commissioned to conduct a post-engagement value survey and analyse the responses, to help the TED team reflect on the experience of the SFA workshops. This was conducted in March 2015, five months after the second Higg workshop in November 2013; and for some almost two years after the first Higg workshop in May 2013.

1. a) Thinking of the investment (time, effort) in preparing for and attending the session/s with Becky and colleagues, what is the impact the work with the “TED’s Ten” strategies has had on your practice for sustainable design? Please choose a number from 1-10. 1 = none at all, the investment wasn’t worthwhile to 10= enormously helpful, well worth the investment
b) Comment on your score (optional)



2. Thinking back to the TED team workshops and lectures by Professor Becky Earley and team what is the first thing/word that comes to mind?

Most people were inspired by the fun workshops, but one person had doubts about some messages. "Remake, redesign. But how can we as fashion company learn (teach) our customer? That is not our core business..."



What word comes to mind when they recall the day?

3. Do you include environmental performance as criteria when making design decisions in your daily work?
- Yes (please explain how)
 - No (please comment on why not)

Respondents try to (or will try to) include environmental performance when making decisions. One replied, "I'll try. Think about all over prints how to use them both ways, what kind of fibres and also start to think chemicals and environmentally friendly accessories."



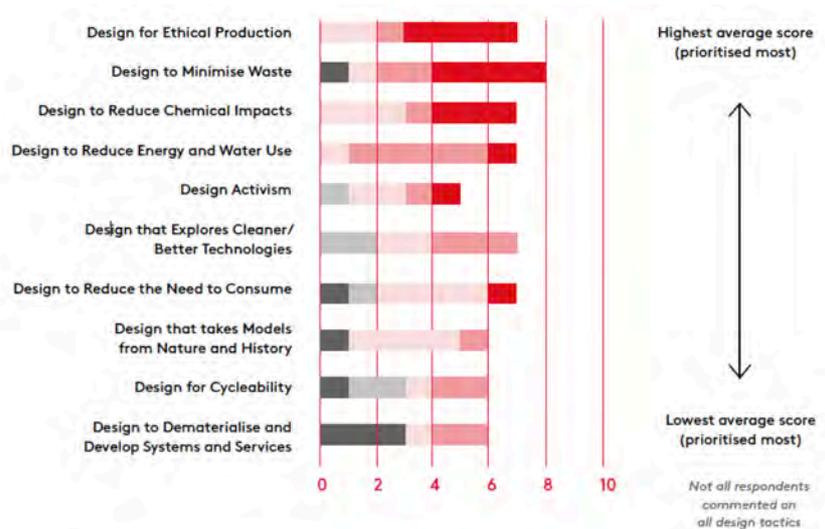
- Yes
- Yes. I'm a pattern maker, and I try to think about how to minimize waste when cutting the fabric
- Yes. I try apply as much as possible when it comes to pattern layout (marker efficiency) and overall shaping
- Partly yes
- I always try to make sustainable fabric choices. Low consumption goes hand in hand with keeping prices down. I would like to do more on design level, as in construction of garment.
- I try as much as possible and the most obvious way is how we push the topic on a material level, when it comes to chemicals, production etc
- I try in my everyday work. Thinking of fabrics that are better for environment, style choices (less consumption), choices of print techniques...
- I'll try. Think about all over prints how to use them on both ways, what kind of fibres and also start to think chemicals and environmental friendly accessories

More certain
in their positivity

Are sustainable design decisions being used in everyday work scenarios?

4. Of the ten design tactics below, which do you prioritise in your work? [5 Yes, vital; 4 Yes, important; 3 Yes, useful to an extent; 2 Perhaps, in time; 1 Not really; 0 No, not at all]
- Design to Minimise Waste
 - Design for Cyclability
 - Design to Reduce Chemical Impacts
 - Design to Reduce Energy and Water Use
 - Design that Explore Cleaner/Better Technologies
 - Design that takes Models from Nature and History
 - Design for Ethical Production
 - Design to Reduce the Need to Consume
 - Design to Dematerialise and Develop Systems and Services
 - Design Activism

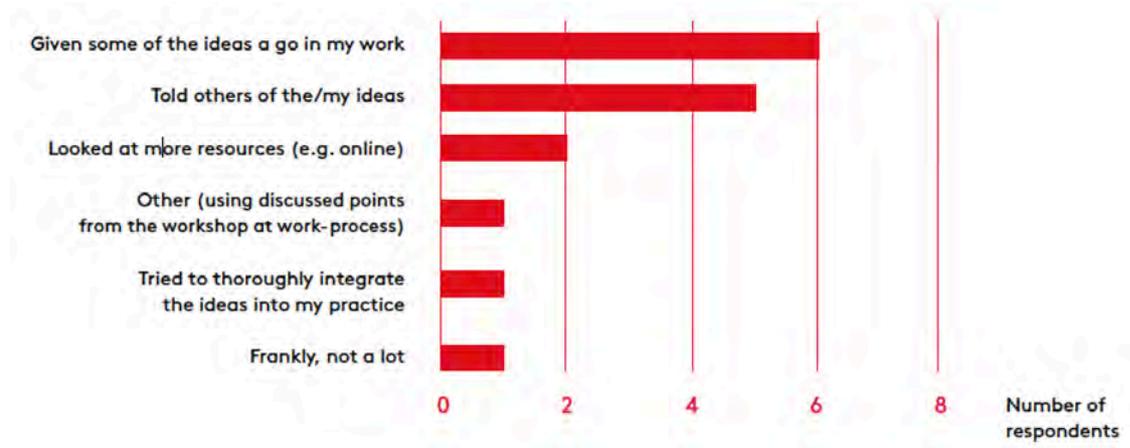
A clear hand could be seen here, with design for ethical production (7) scoring the highest; followed by minimising waste (1), reducing chemicals, water and energy use (3,4); and reducing the need to consume (8); with activism (10) also considered vital.



What strategies do the respondents prioritise now?

5. What, since the workshops, have you done towards more sustainable design (you can choose more than one):
- looked at more resources (e.g. online)
 - given some of the ideas a go in my work
 - told others of the ideas/my
 - frankly, not a lot
 - tried to thoroughly integrate the ideas into my practice
 - other:
- Comment (e.g. what additional support would you need to do more)

What have respondents actually done since the workshop? They report that they have tried ideas out and told others about the ideas.



What has happened since the course?

What do respondents feel they need? Design research expertise to come and work internally in the company, working with mixed teams of buyers and designers.

Respondents comments

- In our company we have a big focus on many things regarding environmental friendly things, but we have not yet reached how to design. As earlier comments, would need an external speaker to come to our company so we can start the buzz. Difficult to retell this subject
- [We] need [the] same knowledge as I have in my team/company. A workshop with all buyers/ designers would be great
- [We need] Knowledge of how to inspire colleagues and make them more interested and active

Figure 108: What do respondents feel they need to progress now?

6. What was the best thing about working with the TED team?

Different people had very different views on the impact and value of their work with The TEN, with the module scoring 7.4/10 overall. One respondent answered, "Working on a chain company makes it difficult with some of the higher brand solutions. A need to find sustainable choices when working with less expensive garments." Another answered, "The seminar and the workshop were extremely inspiring and they gave me a lot of knowledge and motivation."



"Thanks a ton for forwarding the materials. It was one very interesting seminar. Good work pulling off such a great job." Shamik Neogi, Production

Manager, Tierra Products AB

SFA workshop participant, November 2014

"Well done! I think this was the best one so far. Both in terms of material and the way you interacted with the participants."

Andreas Follér, Sustainable Fashion Academy, Stockholm, November 2014

case study 3 – H&M workshops & feedback

Sustainable Design Inspiration at H&M, September 2011 – May 2013, Stockholm

Team & Participants

The stakeholders in this sub-project fell into five groups:

A – The TED team (Earley, Goldsworthy, Vuletich, and CBS/P1 observer Andersen). The roles within the team included Earley as project leader, keynote speaker and workshop facilitator; Goldsworthy and Vuletich as workshop co-facilitators and at times observers; and Andersen as observer. The extended team also included Ribul and Landalv back in London who researched the case studies and worked on the visual presentations.

B – The key H&M staff (Ward, Sohlman, Jakobsson, Hauptmann). These were the H&M staff who steered the design of the SDI programme, and reviewed case study material. Ward led the project in his role at the time of head of the New Development Team; Sohlman was part of initial Mistra discussions and the early meetings, but was not involved later; Jakobsson took on the role of organising and communicating with the TED team and being part of every workshop and lecture event; and Hauptmann was part of early discussions when it was first imagined that the project would result in the design and delivery of a more formal education and training programme but as it turned into an inspiration series, she became less involved.

C – The H&M response group members (9 staff from the White Room). These staff were brought in to take part in a test session that reviewed the overall design of the workshop programme. They gave feedback to the researchers during an afternoon session of approximately 3 hours.

D – The 30 workshop participants, from the New Development team. These were the workshop participants who attended each of the three half-day sessions, and the one-hour lunchtime 'recap' session.

E – The lecture audience; over 350 staff from the Buying Office. All BO staff were invited to the six talks, and had to use an online sign up system to book their place.

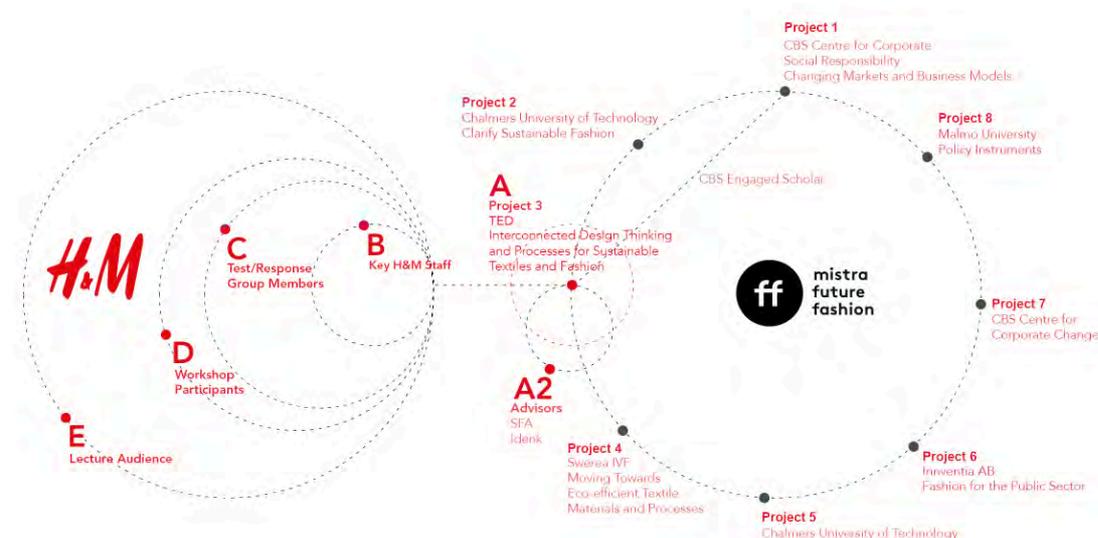


Figure 108: Stakeholder Map for TED's H&M project (2013)
Brief

THE WHY>> We believe that H&M designers have innate know-how to create innovative products that are more sustainable; it is TED's job to provide some directions; sign posts and to guide and support the staff on the journey. We know this may be a new landscape, but we also know the staff are experienced travellers – they just might need a map and a kick-start of energy!

THE WHAT>> The workshops focus on five of the strategies from *THE TEN for H&M*, and are tailored to address a bespoke set of ideas for the H&M buying office staff. We will facilitate this idea development process by using a range of tools and setting tasks including: lifecycle thinking exercises; mapping decision making; time coding innovation; and also reflecting on H&M design decisions from a user/designer perspective. We will use peer review techniques to encourage the group to decide which design concepts are worth developing and use checklists to work out why.

THE HOW>> An important tool used throughout the 3 sessions will be the TED Toolbox. This contains a collection of industry innovations to illustrate how sustainable design is evolving across the globe. By editing and adding to these key ideas and case studies throughout the course, the designers will build an invaluable resource – one which is designed to be taken back to the studio, and even used beyond the life of the course. We will also provide a set of tools and techniques – design thinking tasks, if you like – which can be used to develop design briefs and concepts from the Toolbox in the future, enabling it to be continually updated and relevant. Sustainability is not a static landscape but one dominated by progress and evolution. The Toolbox will help designers to keep ahead of this constantly shifting field and to keep innovation at the heart of their product development.

THE TEN for H&M and the Toolbox are not measurement tools that helps to measure impacts (we can partner with HIGG/SAC others to help us do that) - but rather they offer new ways of thinking about sustainability, that leverage the designer's creativity and unique insights to develop truly innovative products and ideas. The concepts developed will range in scope (near, now and far) but will certainly include a set of actionable designs - intended for the H&M shop floor later this year. Our vision is that one day, you will use the Toolbox and *THE TEN for H&M*, or your own edited version of it, from the very beginning of any product's design, so that sustainability issues are considered as an embedded part of the design process. We hope that in time they could potentially become an integral part of the department's activities – a landscape that designers want to immerse themselves in regularly, in order to get inspired.

Structure

TIME FRAME	TASK	METHODS
PLAN September 2011 – March 2013	Development: Email exchanges, F2F discussions and 'run through' sessions in Stockholm took place over an 18-month period	<ul style="list-style-type: none"> • Discussion • Visual Presentations, new case study research • Written Proposals
ACT April 2013 – October 2013	Delivery: A one-hour lecture given six times to a total of 350+ employees from the Buying Office in Stockholm. 13.03.13 – am (rehearsal) 24.04.13 – am & pm 24.05.13 – am & pm 20.06.13 – am & pm	<ul style="list-style-type: none"> • Case study research, peer reviewed by H&M staff • Digital presentation tool, Prezi • Reflective questionnaires for the team • Video/audio and photographic documentation
OBSERVE April 2013 – October 2013	Delivery: 3 x 4-hour workshops and 1 x 1-hour recap session with 30 staff from the New Development Team. 25.04.15 – Workshop 1, am 23.05.13 – Workshop 2, am 19.06.13 – Recap session, 1 hr 03.10.13 – Workshop 3, am	<ul style="list-style-type: none"> • Workshop design and facilitation • Pre Survey • After action review • Training team in facilitation & consultancy skills • Reflective questionnaires for the team • Review of decisions made by participants – Now, Near, Far cases; redesign concepts • Video/audio and photographic documentation
REFLECT November 2013 – May 2013	Assessment: Post course testimonial statements; interviews; online survey	<ul style="list-style-type: none"> • Interviews • Discussion • Online survey conducted by Idenk • Review of design concepts and decisions made

Table 19: The H&M programme design and research methods utilised

Outcomes

The outcomes of the workshops are presented throughout parts 4.1.3 to 4.2.1 of this report.

Feedback

QUESTIONS & ANSWERS: H&M Pre Workshop Survey (April 2013)

These are the details of results presented at the beginning of the course, to show the group 'where they were' as a team.

1. Do you currently include environmental performance as criteria when making design decisions in your daily work?

- If you do, how do you do this specifically?
- If not, why not?

63% said they did

42% said they didn't

2. How inspired do you currently feel about creating more sustainable H&M design concepts?

- Extremely - can't wait to get going!

- Excited - maybe a bit apprehensive...
- Uninspired - this is mission impossible.

68% extremely excited

26% excited but apprehensive

5% said uninspired on account of it being 'mission impossible'

3. Did you attend the March 13th lecture by Becky Earley, 'Sustainable Design Inspiration: The TEN for H&M'? If so, please comment on up to three things that have since proved to be useful in your day-to-day work. (If there was nothing, then leave the boxes blank!)

4. Of the five design tactics below, which do you prioritise in your work? [5 Yes, vital; 4 Yes, important; 3 Yes, useful to an extent; 2 Perhaps, in time; 1 Not really; 0 No, not at all]

- Design to Minimise Waste
- Design for Cyclability
- Design to Reduce Chemical Impacts
- Design to Reduce Energy and Water Use
- Design that Explore Cleaner/Better Technologies

Any other comments?

Reducing chemical impacts was seen as vital, followed by energy, water and new technology.

A few, not many, recognised cyclability and reducing waste as vital, which was odd given that when asked the next question, many answered to the contrary.

	5 Yes, vital	4 Yes, important	3 Yes, useful to an extent	2 Perhaps, in time	1 Not really	0 Not at all
Design to Minimise Waste	18.75% 3	43.75% 7	25.00% 4	12.50% 2	0.00% 0	0.00% 0
Design for Cyclability	12.50% 2	50.00% 8	31.25% 5	6.25% 1	0.00% 0	0.00% 0
Design to Reduce Chemical Impacts	64.71% 11	29.41% 5	5.88% 1	0.00% 0	0.00% 0	0.00% 0
Design to Reduce Energy and Water Use	52.94% 9	23.53% 4	17.65% 3	5.88% 1	0.00% 0	0.00% 0
Design that Explores Cleaner/Better Technologies	50.00% 8	18.75% 3	18.75% 3	12.50% 2	0.00% 0	0.00% 0

Table 20: What strategies do H&M designers want to prioritise? Pre-survey results (2013)

5. Please describe what aspect of sustainable design you are most curious about.

- Recycling
- DIY how to renew the old. The small stuff in our daily life to do for a better course
- I am curious in which ways we can further develop our sustainable design besides using recycled qualities. Which other realistic possibilities do we have to work with?
- To implement in my daily work...what I am not so sure about yet though
- Less chemicals added into the fabric, dangerous colours

- Water saving
- Whole life cycle friendly
- Material developments and how to help suppliers and factories to be more interested and motivated in working sustainable
- As a buyer my most important aspect is to buy not to have a huge over stock and left over products. And to design for sustainable and long time use, being able to recycle it
- Recycled materials
- 3D printing
- Learn more about sustainable materials and techniques to save water and energy. How to do get sustainable design into an every day mindset
- New technology and inventions that makes it easier to make a sustainable choice- new printing and dyeing techniques for example
- New technologies
- Generally, I think it's important for H&M to move away from building the collection purely around trends. A greater focus on core products that incorporate fashion with longevity is key for today's customer and for our communication.

6. Now that you are signed up to the course, what specific concerns do you have about sustainable design that you would like us to address during the program - to ensure it feels like a good use of your time?

- To get inspired to think about sustainability more
- Try to 3d print
- Extend possibilities, not being so forced to being so narrow
- Practical things you can start to do immediately
- I don't know
- The quick and easy ways to do it
- How much is conscious aloud to cost, and how big are our contribution to the world
- How can we help the production side to find more licensed suppliers/factories and to help them source and find sustainable materials and methods
- Want specific ideas that can be used in daily work. Fun fact is always nice - but is it something we can do in H&M?
- Can't think of anything at the moment
- Recycling
- To increase the general knowledge and see possibilities instead of limitation
- What specific techniques and inventions can be applied in my daily work
- Things/ideas we can't affect
- Design longevity, product focus

7. To prepare for the workshop, we need each participant to look in their wardrobe and bring along TWO H&M garments: one which they have worn a lot; and one which they have not worn at all (or very rarely). Please comment on these items below, telling us why they are 'successful' or 'unsuccessful'.

- My 'well worn' H&M garment is...
- My 'unworn' H&M garment is...

8. Please tell us your name, your job title, and length of time at the company. (You don't have to fill this page out.)

9. Thank you very much for completing this survey for us. Is there anything else you want to add or ask at the moment? Please write it below if so. We are really looking forward to working with you at the

workshops!

The only comment left when we asked for anything else they wanted to add to the survey was – *How will this be workable in the house when cost conscious is more important than sustainability?*

QUESTIONS and ANSWERS: H&M Post Workshop Online Survey (March – April 2015)

After the last workshop in 2013 the TED team asked the participants to complete an online questionnaire and conducted a short interview with the H&M managers. We surveyed the workshop participants more than a year after the workshops were completed. 14 (less than 50%) of the participants replied.

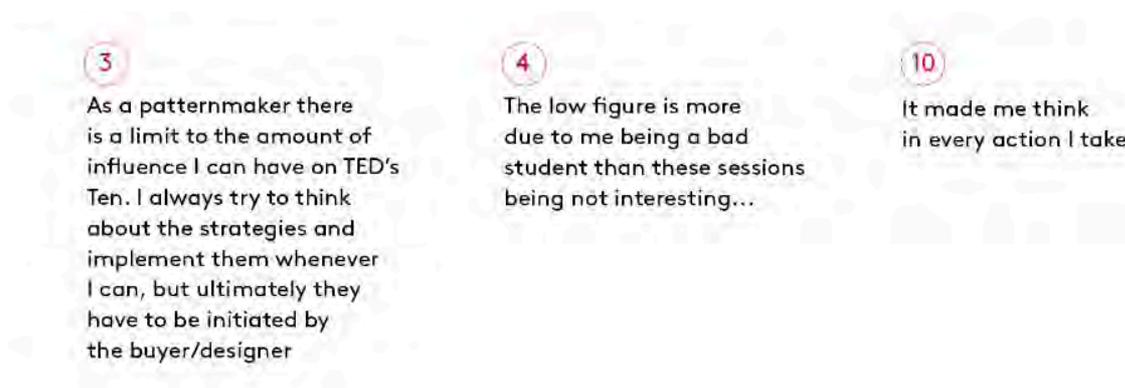
1. a) Thinking of the investment (time, effort) in preparing for and attending the session/s with Becky and colleagues, what is the impact the work with the “TED’s Ten” strategies has had on your practice for sustainable design?

Please choose a number from 1-10

1 = none at all, the investment wasn’t worthwhile to 10= enormously helpful, well worth the investment

b) Comment on your score (optional)

Some scored low (3,4,5) noting that time was the main issue, some scored high (8,10) and reported a significant change in the way they approached their everyday work.



2. Thinking back to the TED team workshops and lectures by Professor Becky Earley and team what is the first thing/word that comes to mind?



3. Do you include environmental performance as criteria when making design decisions in your daily work?

a) Yes (please explain how)

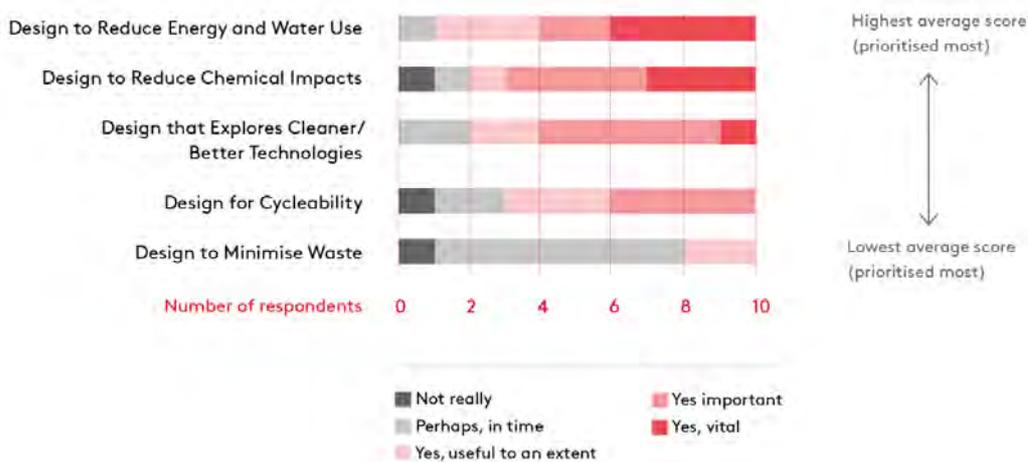
b) No (please comment on why not)

This time the score had risen from 63% to 70% for 'yes'.

YES (7 respondents of 10)	NO (2 respondents of 10)
<ul style="list-style-type: none"> → By using proofed case studies → Always → I work with Conscious exclusive every year → I add my comments as a patternmaker I don't design the garments, but I can comment on details → Always value if there is possibility to make it in Conscious fabric in our collection → Absolutely. Recycle, printing on two sides of the paper. I even started to think more about it at home → I do a lot of highcolor printing (digital) and that is a method that uses at least less water 	<ul style="list-style-type: none"> → Not really to be honest. It is difficult as a pattern maker to override buying / design decisions but where possible and practical I try to offer suggestions → Trying to but timeline doesn't allow so often :/ <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>One respondent pointed out at the end of the survey that 'This is a long term work. We just make small steps'</p> </div>

4. Of the five design tactics below, which do you prioritise in your work? [5 Yes, vital; 4 Yes, important; 3 Yes, useful to an extent; 2 Perhaps, in time; 1 Not really; 0 No, not at all]
- f. Design to Minimise Waste
 - g. Design for Cyclability
 - h. Design to Reduce Chemical Impacts
 - i. Design to Reduce Energy and Water Use
 - j. Design that Explore Cleaner/Better Technologies

This time energy and water came first – possibly because of the workshop discussions around the impacts from laundry and consumer use. Reducing chemical impacts came next, and then technology. Cyclability and reducing waste scored lowest again.



5. Any other comments? **None entered.**

H&M Feedback with Key Participants via Email

"To what extent these findings can be applied to the current design process at H&M is something we are working on right now. My understanding of the research carried out within MiFuFa is that most of it (of course) has a long-term perspective on the problems regarding Fashion and sustainability. It's in the nature of these things that there is no "quick fix". In the fast moving world of fashion this is something we need to realise and understand. The questions are large and long term, so I believe we need to have

patience and understand that the answers also need some time to take shape.” Petter Klusell, designer at H&M’s buying office

“It makes a difference that Becky, Clara and the TED team are designers. So much - you do get the same language as the designers here, so of course that’s an advantage. The TED team is also aware that you can’t really run a pure sustainable agenda, you mainly need to have a good product first of all, that someone wants. There is nothing as un-sustainable than to try to sell something that no one wants. You can’t waste the resources. That’s fundamental. From that perspective it is very much of an advantage that they have the background from the business themselves.” Johan Ward, H&M

“I’ve been here [H&M] for three years, and the first time I went to production in Portugal was last week. For the first hour I learned more than I’ve done the whole time here. The same thing with the course, when you feel you’re involved - now I understand, then you want to change things.” Heidi, product designer, New Development Team

“It refreshed your mind and also think once more, I think that’s what I got from the workshops. What I got back was mainly to think one more time when we are doing decisions, a reminder I think. But also it was nice to get to know these new ideas that are coming up because you don’t hear so much about it during the day, the new sustainable things, the machines and printing and the qualities that are coming. So it was actually very refreshing to hear that new things are coming so you are a little bit aware when it comes to - when it will be reachable for us here. I feel there is maybe just a little bit reachable for smaller companies or the ones that are really developing new technologies but it’s the future we’re talking about. So I mean the future it’s good to know what you’ve been talking about and we’ll probably use it in a couple of years as we did. The workshop was to put it on a timeline: today, in the future or near future, whatever it was...” Simon Hallin, buyer, New Development Team

“The “role” of the designer within The TEN is at H&M a “work” not done by a single individual = The designer. Rather it’s split within the organization spanning over designers, buyers, product developers and various other roles within our production offices/organization. This means that it’s probably more of a challenge than first expected to apply The TEN to our organisation. I do think the “tools” for sustainable thinking provided by TEDS are very powerful, but it’s not as simple as seeing the designer as a “key” player since this designer is actually a lot of different people with different responsibilities. How the methods in The TEN can be “scaled up” and merged with H&M’s method is something we believe is worth putting some thinking into. This combined with the HIGG index for evaluating the effort is then maybe a starting point to reach the next level of creating sustainable fashion?” Petter Klusell, designer at H&M’s buying office

H&M Feedback with Key Participants via Interviews

Kirsti Reitan Andersen, a Mistra PhD student from Copenhagen Business School (CBS), interviewed SDI participants to find out if the TED team being designers themselves made a difference to the participants, who were all from the Buying Office, specifically the New Development Team (perhaps the most creative of the design teams at H&M):

“It’s good. It was also like high technology. I mean the team is really inspiring, very energetic and normally the other education we have here is with people from H&M, internal courses and so on. It’s nice to get another view of things.”

“Yes... she has some knowledge of course about the production chain. I think for really doing our job more sustainable here it would be so good to have somebody actually watching our production chain from the inside and sometimes with our research... because our production chain is maybe not so different from any other company’s. But in a sense it’s ... to find that there are actually tools for us.”

Andersen also asked the H&M staff about the visual tools like the ‘Now Wall’, and overall if the course was inspiring:

“Yes, the Now Wall we had in the kitchen so I think everybody saw it...”

“Yes, really good to have it physically and not only digital. Digital, I think people seem to forget; it’s

*always better to have something physical to look at. It creates a buzz more than a digital version.”
“I think they make you think in a way that maybe it wasn’t the set things that we were talking about but just the mindset.”*

What did the H&M participants take away from the SDI course?

*“It refreshed your mind and also think once more, I think that’s what I got from the workshops...”
“What I got back was mainly to think one more time when we are doing decisions, a reminder I think.”
“... It did increase the discussion. I mean we discussed it over the table after.”
“... For me it’s a lot about finding a really good way of working where I can save some time to do some reflections sometimes about the collection...”*

appendix 2 – tables & figures

tables & figure credits

Tables

- Table 1: Project 3 action research framework and stages
- Table 2: Project 3's stages, tasks, research questions and audience
- Table 3: The PhD Project Timeline
- Table 4: Planning, stage 1, project 3
- Table 5: Acting, stage 2, project 3
- Table 6: Observing, stage 3, project 3
- Table 7: Reflecting, stage 4, project 3
- Table 8: KPI's, project 3
- Table 9: The project 3 methods mapped into the framework
- Table 10: Textile Toolbox analysis of gaps and hotspots of the sustainable Swedish landscape
- Table 11: Data set hands of cards
- Table 12: CCW 'Reading & Practice Group' (2011 - 2012)
- Table 13: Konstfack University: TED Electives 2012 & 2013
- Table 14: H&M barriers and creative solutions
- Table 15: Improved Higg Index scores – results of the SFA workshops (*May 2013 Workshop; * *November 2014 workshop)
- Table 16: Recommendations for future research for stakeholders, themed by product, society and self
- Table 17: SFA workshops audience
- Table 18: Results from the After Action Review Sheets at SFA
- Table 19: The H&M programme design and research methods utilised
- Table 20: What strategies do H&M designers want to prioritise? Pre-survey results (2013)

Figure Credits

All photos and diagrams by members of the UAL TED research team unless otherwise credited.

1. Materials, Models and Mindsets (Earley, Goldsworthy & Vuletich, 2015)
2. The new 'T' for textile design is an 'I' – extending the shape by building in sustainability expertise and deeper knowledge of oneself and others
3. Visualisation of the P3 deliverables and the interactions with other projects
4. The revised TEN strategies, v2 (Earley & Politowicz, 2012)
5. Clara Vuletich (left), PhD researcher for Project 3, June 2012
6. Design for Change bags, VF Corp commission, 2012. (Photo: Robert Self)
7. The Textile Toolbox exhibition at FIT in New York (June 2015)
8. Mistra Future Fashion Phase, Timeline 2011-2015:
 - I. MiFuFa project begins, kick off event in London. (TED, 2011)
 - II. Presentation, CBS, Copenhagen. (TED, 2012)
 - III. TED'S 24 workshop. (Photo: Jose Farinha, June 2012)
 - IV. Website launches with first review blogs. (Photo: Polimekanos, 2012)
 - V. Elective program begins at Konstfack. (2012)
 - VI. EAD10, Paper and workshop. (2013)
 - VII. H&M lecture series & workshops: Higg Index workshop conducted at SFA. (2013)
 - VIII. Final H&M workshop. (2013)
 - IX. Chinese field research and Chinese cards, Shanghai. (2013)
 - X. Textile Toolbox exhibition online and at Chelsea. Tour Begins. (2014)
 - XI. Exhibition tours to FIT New York. (Photo: Mischa Haller, 2015)
 - XII. PhD Thesis submitted. (May 2015)

9. 'Practice-based Fundamental Design Research', Walker (2013)
10. Think, Make, Share – methods from Goldsworthy's PhD thesis (2013)
11. Project 3's Methods Framework, Vuletich 2015
12. <https://languagelearningonline.wordpress.com>
13. a. 'The worksheet tools used to capture ideas in both the planning and delivery stages of the project
b. Rebecca Earley (right) with the New Development Team, H&M, Stockholm, May 2013
14. Hand 5 plays strategies 3, 4 and 5
15. Hand 6 plays strategies 2, 8 and 9
16. Hand 7 plays strategies 1 and 8
17. Hand 3 plays strategies 2 and 9
18. Hand 8 plays strategies 3 and 4
19. Hand 9 plays strategy 5 and 8
20. Hand 10 plays strategies 8 and 9
21. Workshop session, Chelsea College of Arts (2011)
22. Elective introduction meeting, design outcome, student design presentation
23. Konstfack studio, Black Hack workshop at Konstfack
24. Hand 11 revealed that students played a lead strategy 10 with strategies 2 and 9
25. Clockwise from top left: Hands 12-15 show lead strategy with connected strategies from Konstfack students Matilda Dominique (2013), Lisa Axelsson (2013), Frida Aberg (2014) and Martina Skender (2014)
26. Left, TED Coding for H&M talks: Hand 18 with lead strategies 1-5 followed by 6-10; Right, Hand 16 with strategies 1-3, followed by strategies 4-5 (2011-2014)
27. From the model by Gianni Schiuma, from *The Value of Arts for Business* (2011)
28. H&M workshop model - Adapted from Idenk's Decision Making Diamond (Earley, 2013)
29. H&M's 7 Conscious Commitments
30. The TEN strategies overlaid onto the H&M Conscious Commitments
31. The 'Thinking Together' worksheets, ready for Professor Becky Earley's 'Sustainable Design Inspiration' H&M Lecture sessions, March – June 2013
32. Left, a 'Thinking Together' moment in the H&M lecture, June 2013
33. Energised exchanges after the H&M lecture, June 2103
34. Hand 18 with strategies 3-5, 1-2, and then 6-10, for the SFA workshops (2011-2014)
35. Garment Score card
36. Redesign concept 24
37. Redesign concept 19
38. Redesign concept 20
39. SFA May 2013 - Redesign concept 7
40. SFA May 2013 - Redesign concept 8
41. SFA May 2013 - Redesign concept 9
42. SFA June 2012 - Redesign concept 2
43. SFA June 2012 - Redesign concept 4
44. SFA June 2012 - Redesign concept 6
45. Left, hand 19 considers lead strategies 2, 3 and 4 at H&M; and right, hand 22 connects strategies 9 and 10 with 6, 7 and 8 at SFA
46. Hand 23 plays strategy 2 in large companies and strategy 10 in SME's
47. The Textile Toolbox online exhibition, www.textiletoolbox.com
48. TED team and CBS researchers at The EcoChic Awards, Hong Kong Fashion Week, 2013
49. Hand 32, Seamsdress lead card strategy 2, followed by strategies 1, 3, 4, 5, 6 and 9.
50. Seamsdress and Laser Line (Photo: Phillip Koll, styled by Lou'Ann Carron)
51. Hand 26, DeNAture's lead card strategy 2, followed by strategies 1, 3, 5, 6, 8, 9 & 10
52. DeNAture and Design Possibilities in Regenerated Cellulose Materials (Photo: Miriam Ribul)
53. Hand 24, ASAP's lead card strategy 5, followed by strategies 1, 2, 3, 4 and 10
54. A.S.A.P Paper Cloth and A.S.A.P paper samples
55. Hand 29, SWEAVER's lead card strategy 1, followed by strategies 6, 7 and 9
56. SWEAVER hand woven sample collection
57. Hand 31, Fast ReFashion's lead card strategy 9, followed by strategies 1, 2, 8 and 10
58. Fast ReFashion Shirt (Photo: Phillip Koll, styled by Lou'Ann Carron)
59. Hand 28, Smorgasboard's lead card strategy 9, followed by strategies 5, 6, 8 and 10

60. Smörgås Board garments & pattern, toolbox design process. (Photo: Mischa Haller)
61. Hand 33, Inner/ Outer Jacket's lead card is 10, followed by strategies 1, 2, 6 and 7
62. Inner/ Outer Jacket (Photo: Phillip Koll, styled by Lou'Ann Carron)
63. Hand 25, Shanghai Shirt's lead card 10, followed by strategies 1, 2, 3, 4, 6 and 7
64. Shanghai Shirt process and Shanghai Shirt details
65. a. Harvey's Chopstick Headdress, Redressing Activism (2014) (Photo: Phillip Koll, styled by Lou'Ann Carron)
- b. Hand 27, Redressing Activism's lead card is 10, followed by strategy 1, 2 and 6
66. Redressing Activism shirt, skirt & shoes (Photo: Phillip Koll, styled by Lou'Ann Carron) Kong
67. Hand 30, Library Jumper's lead card strategy 8, followed by strategies 2, 6 and 10
68. Library Jumper (Photo: Phillip Koll, styled by Lou'Ann Carron)
69. Paper Cloth samples and Fast ReFashion 'Fractal Shirt'
70. Left, regenerated cellulose fibres from cotton and denim, and right, coded regenerated cellulose (Photo: Miriam Ribul 2014)
71. Waddilove's System Innovation Cards. (Photo: Barry Waddilove)
72. THE TEN cards in Chinese & Swedish
73. TED Redesign Audit Sheet for H&M
74. TED Case Study Card
75. The Textile Toolbox Toolkit contents and THE TED RED BOX
76. The TED RED BOX layout design
77. The TED RED BOX strategy divider / folder, and NOW, NEAR and FAR Stamps
78. TED's The TEN and HIGG Score Sheet
79. The Now Wall reconstructed after the workshop by the coffee machine
80. Barriers and Opportunities poster
81. H&M Barriers and Opportunities poster
82. H&M Postcards sent back to TED in London
83. Black Hack Chat film; and Black Hack Chat Skype mentoring between London and Gothenburg
84. Stills from the project 3 intro animation and The TEN animations, SokFok Studio (2014)
85. Rebecca Earley's 'Cool School Tools' workshop, The Well Gallery, London, 2015
86. Rebecca Earley's 'Cool School Tools' toolbox, The Well Gallery, London, 2015
87. Design for Change denim bags, 2012 (Photo: Robert Self)
88. Left: Tim Brown's 'T' shaped designer (2006); becomes the reflective and self-aware 'I' shaped designer (centre, Earley et al, 2015); and then becomes the heart shaped 'social' designer (Vuletich, 2015)
89. Inner/Outer jacket (Photo: Phillip Koll, styled by Lou'Ann Carron)
90. Green Question Cards (Earley & Vuletich, 2013)
91. Drawing by SFA participant in response to Green Cards, 2013
92. Left, Textile Talk Kit in use, workshop with garment workers, China, 2014. Right, Sutra Stitching Workshop, London, 2013
93. Hand 1 combines lead strategy 5 with strategies 3 and 4
94. Hand 2 aligns strategies 2 and 5
95. *Materials, Models, Mindsets* (Earley, Goldsworthy, Vuetich 2015)
96. The central sections of the *Material, Models and Mindsets* Venn diagram (Earley, Goldsworthy, Vuletich, 2015)
97. TED Elective with Konstfack students (2013)
98. Question Flagging technique, adapted from Idenk (2013)
99. Otto von Busch, Zine Production (2013)
100. Ida Petterson (2013)
101. Ground is not Level, by Ida Petterson (2013)
102. I Want My Work to Speak Clear, Ida Petterson (2013)
103. Sketches from the Treehugger Capsule Collection by Lisa Axelsson (2013)
104. Lisa Axelsson at her desk and her manifesto (2013)
105. Matilda Dominique reading her manifesto www.matildadominique.com (2013)
106. Talking Threads sample by Matilda Dominique, www.matildadominique.com (2013)
107. Talking Threads sample by Matilda Dominique, www.matildadominique.com (2013)
108. Garment Redesign Sheet for SFA workshops (2013)
109. Stakeholder Map for TED's H&M project (2013)

110. Top left: Exhibition pop up at Chelsea College of Arts (Photo: Mischa Haller). Top right: Fashion Textile Centre Borås. Bottom right: Zero Waste Scotland. Bottom left: Shanghai Shirt II (Photo: TFRC)

appendix 3 – project bibliography

project bibliography

Books, Journals, and Periodicals

- Aizenshtein, E. M. (2012). 'Global chemical fibre production in 2011', *Fibre Chemistry*, 44(3).
- Anderson, C. (2006). *The Long Tail*. New York: Hyperion.
- Baudrillard, J. (1981). *For A Critique of the Political Economy of the Sign*. St. Louis, MO: Telos
- Baumann, H., Boons, F. and Bragd, A. (2002) 'Mapping the green product development field: engineering, policy and business perspectives', *Journal of Cleaner Production*, 10, pp. 409-425.
- Benn, S., Dunphy, D., & Perrott, B. (2011) *Cases in Corporate Sustainability and Change: a Multi-Disciplinary Approach*. Melbourne, Australia: Tilde University Press.
- Berg, B. (2007) *Qualitative research methods for the social sciences*. USA, California: Pearson Sate University.
- Berry, M. (1993) 'Changing perspectives on facilitation skills development', *Journal of European Industrial Training*, 17(3), pp.22-32.
- Botsman, R. (2011) *What's mine is yours: collaborative consumption*. London: Harper Collins.
- Braungart, M. and McDonough, W. (2002) *Cradle to cradle: remaking the way we make things*. New York: North Point.
- Brown, T. and Wyatt, J. (2010) 'Design thinking for social innovation', *Stanford Social Innovation Review*, (Winter 2010), pp.30-35.
- Brown, T. (2009) *Change by design: how design thinking transforms organisations and inspires innovation*. New York: Harper Collins.
- Brown, T. (2008) 'Design thinking', *Harvard Business Review*, (June), pp.84-92.
- Carter, P. (2004) *Material thinking: the theory and practice of creative research*. Carlton, Victoria: Melbourne University Publishing.
- Chapman, J. (2005) *Emotionally durable design: objects, experiences and empathy*. London: Earthscan.
- Cline, E. L. (2013) *Overdressed: The Shockingly High Cost of Cheap Fashion*. New York: Portfolio.
- Cooper, T. (2010) *Longer lasting products: alternatives to the throwaway society*. London: Ashgate.
- Cross, N. (2001) 'Designerly ways of knowing: design discipline versus design science', *Design Issues*, 17(3), pp. 49-55.
- Dawson, T. (2012) 'Erratum: progress towards a greener textile industry', *Coloration Technology*, 128(4), pp. 261-269.
- Denzin, N. and Lincoln, Y. (eds.) (1994) *The Sage handbook of qualitative research*. Sage Publications.
- Dweck, C. (2006) *Mindset: the new psychology of success*. New York: Random House.
- Ehrenfeld, J. (2008) *Sustainable by design: a subversive strategy for transforming our consumer culture*. New Haven & London: Yale University Press.
- Emilson, A. Hilgren, P. and Seravalli, A. (2011) 'Dealing with dilemmas: participatory approaches in design for social innovation SVID', *Swedish Design Research Journal*, 1(11), pp. 23-29.
- Erwin, K. (2013) *Communicating the new: methods to shape and accelerate innovation*. New York: Wiley.
- Fletcher, K. and Grose, L. (2012) *Fashion & sustainability: design for change*. London, Earthscan.
- Fletcher, K. (2008) *Sustainable fashion & textiles: design journeys*. London: Earthscan.
- Fletcher, K. (2010) 'Slow fashion: an invitation for systems change', *Fashion Practice*, 2(2), pp. 259-266.
- Fletcher, K. and Grose, L. (2012) *Fashion and sustainability: design for change*. UK: Earthscan.
- Fuad-Luke, A. (2007). *Redefining the purpose of (sustainable) design: enter the design enablers, catalysts in co-design*, in Chapman, J. and Gant, N (eds.) *Designers, visionaries and other stories: a collection of sustainable design essays*. London: Earthscan.
- Fuad-Luke, A. (2009) *Design activism: beautiful strangeness for a sustainable world*. London: Earthscan.
- Gamman, L. and Thorpe, A. (2011) 'Design with society: why socially responsive design is good enough', *CoDesign: International Journal of CoCreation in Design*, 7(3-4), pp. 217-230.
- Geels, F. (2004) 'From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory', *Research Policy*, 33(6/7), pp. 897-920.

- Goldsworthy, K. and Lang, D. (2010) 'C2C: without a trace', *Viewpoint*, 26, pp. 108-115.
- Gordon, B. (2011) *Textiles: The Whole Story*. US: Thames & Hudson.
- Graedel, T.E. et al. (1995) 'Green product design', *AT&T Technical Journal*, Nov/ Dec, pp. 17-24.
- Gray, C. and Burnett, G. (2007) *Making Sense: 'Material thinking' and 'materializing pedagogies'*
Invited journal paper for *interactiveDiscourse – International On-line Journal of Learning and Teaching in Higher Education* ISSN: 1756-3445 1(1).
- Gwilt, A. (2014) *A Practical guide to sustainable fashion*. UK: A & C Black.
- Gwilt, A. (2011) 'Producing sustainable fashion: the points for positive intervention by the fashion designer' in Gwilt, A. and Risannen, T. (eds.) *Shaping sustainable fashion*. UK: Earthscan.
- Harper, C. (2012) *Textiles: critical and primary sources*. Oxford: Berg Publishers.
- Hawley, J. (2009) *Sustainable textiles: lifecycle and environmental impact*. UK: Woodhead Publishing.
- Hornbuckle, R., Sutton, T., Qualmann, C. (2009) *Are We the Tool? Engaging Artefacts*, Nordic Design Research Conference.
- Houde, S. and Hill, C. (1997) 'What do prototypes prototype?' in Helander, M. G., Landauer, T. K., & Prabhu, P. (eds.) *Handbook of Human-Computer Interaction*. 2nd edn. Amsterdam: Elsevier Science B.V.
- Igeo, E. (2010) 'The tacit turn: textile design in design research', *DUCK: Journal for Research in Textiles and Textile Design*, 1.
- Jackson, T. (2009) *Prosperity without growth: economics for a finite planet*. London: Routledge.
- Kimbell, L. (2011) 'Rethinking design thinking: part 1', *Design and Culture*, 3(3), pp. 285-306.
- Kirkpatrick, D.L. (1959) *Learning Evaluation Model*, adapted by Chapman, A. (1995 –2014) Available at: <http://www.businessballs.com/kirkpatricklearningevaluationmodel.htm>, (Accessed: October 30 2014).
- Koskinen, I. and Niinimäki, K. (2011) 'I love this dress it makes me feel beautiful! empathic knowledge in sustainable design', *The Design Journal*, 14(2), pp. 165-186. (Accessed: 6 March 2015).
- Krznicar, R. (2014) *Empathy: a handbook for revolution*. London: Random House.
- Leadbeater, C. (2007) *We Think: mass collaboration, not mass production*. UK: Profile Books.
- Manzini, E. (2010) *Small, local, open and connected: design research topics in the age of networks and sustainability*. LeNS Conference. Bangalore, India, 29 September – 1 October. Sheffield: Greenleaf Publishing. pp. 14-18.
- McGilchrist, I. (2009) *The master and his emissary: the divided brain and the making of the Western World*. UK: Yale University Press.
- Mulgan, G. (2011) *Recipes for systemic change*. Finland: Helsinki Design Lab.
- New Economics Foundation (2010) *Reimagining the high street: escape from clone town Britain*. London: New Economics Foundation.
- Piliavin IM, Rodin J & Piliavin AA (1969) *Good Samaritanism: an underground phenomenon*. *Journal of Personality & Social Psychology*, 13(4), pp. 289-299.
- Philpott, R. (2013) *Engineering Opportunities for Originality and Invention: The importance of playful making as developmental method in practice-led design research*. *Studies in Material Thinking*, Vol. 9 [available at www.materialthinking.org/sites/default/files/papers/SMT_V9_05_Rachel_Philpott.pdf]
- Press, M. (2007) *Handmade Futures: The Emerging Role of Craft Knowledge in Our Digital Culture* in Alfoldy (ed) 'NeoCraft: Modernity and the Crafts', *The Press of the Nova Scotia College of Art and Design*
- Schiama, G. (2011) *The Value of Arts for Business*. New York: Cambridge University Press.
- Senge, P. (2006) *The fifth discipline: The art and practice of the learning organization*. USA: Broadway Publishing.
- Seravalli and P.-A. Hillgren (2011). *Dealing with Dilemmas: Participatory Approaches in Design for Social Innovation*. *Swedish Design Research Journal* 1(11). pp. 23-29.
- Tham, M. (2010). *Languaging fashion and sustainability: Towards synergistic modes of thinking, wording, visualising and doing fashion and sustainability*. *The Nordic Textile Journal* 3(1): 14-23
- Thorpe, A. (2012) *Architecture & design versus consumerism: how design activism confronts growth*. London: Routledge.
- Tonkinwise, C. (2011) 'A taste for practices: unreprassing style in design thinking', *Design Studies*, 32(6), pp. 533-545.
- Walker, S. and Giroud, J. (eds.) (2013) *The handbook of design for sustainability*. London: Bloomsbury Publishing.

- Walker, S. (2013) 'Imagination's promise: practice-based design research for sustainability' in Walker, S. and Girard, J. (eds.) *Handbook of design for sustainability*. London: Bloomsbury Publishing, pp.446-465.
- Wardale, D. (2008). *A Proposed Model for Effective Facilitation*. Group Facilitation: A Research & Applications Journal, 9, 49 – 58.
- Webster, K. (2015) *The Circular Economy: A Wealth of Flows*. Ellen MacArthur Foundation Publishing: Cowes, Isle of Wight
- Wood, J., (2013), *Metadesigning Paradigm Change: an ecomimetic, language-centred approach*, in Handbook of Design for Sustainability, Walker, S., & Giroud, J. Berg: London
- Wölfel C. and Merritt T. (2013) 'Method card design dimensions: a survey of card based design tools', *Lecture Notes in Computer Science*, 8117, pp. 479-486.

Reports

- Allwood, J.M., Laursen, S.E., Malvido de Rodriguez, C. and Bocken, N. (2006) *Well dressed? The present & future sustainability of clothing & textiles in the UK*. Cambridge: Institute for Manufacturing.
- Backlund, B. and Nordström, M. (2014) *Nya produkter från skogsråvara , En översikt av läget 2014 (New products from forest based materials)*. Available at: <http://www.innventia.com/Documents/Rapporter/Innventia%20report%20577.pdf> (Accessed 15 July 2015).
- BSR (2014) *Women in factories China program*. Available at <http://www.bsr.org/en/our-work/partnership-development/wif> (Accessed: 29 July 2014).
- BSR (2014) *Her project*. Available at: <http://herproject.org/> (Accessed: 25 July 2014).
- BSR (2010) *Beyond monitoring: a new vision for sustainable supply chains*. Available at: www.bsr.org (Accessed: 4 August 2012).
- Clean Clothes (2005) *Looking for a quick fix: how weak social audits are keeping workers in sweatshops*. Available at: https://archive.cleanclothes.org/documents/05-quick_fix.pdf (Accessed: 1 September 2012)
- Colburn, M. (2011) *Reading into Norwegian Wool: An Annotated Bibliography for Textile Innovators and Entrepreneurs*. Available at: http://www.sifo.no/files/file78030_project_note_2-2012_reading_into_norwegian_wool.pdf (Accessed 15 July 2015).
- Deloitte (2013) *Fashioning Sustainability*. Available at: <https://www2.deloitte.com/content/dam/Deloitte/dk/Documents/strategy/Deloitte-Fashioning-Sustainability-2013.pdf> (Accessed 14 July 2015).
- Cupit, M.J. (1996) *Opportunities and barriers to textile recycling*. Abingdon, Oxfordshire: AEA Technology.
- Earley, R. (2005-2010) *Worn again: rethinking recycled textiles*. Internal AHRC report. Unpublished. Available at: <http://www.arts.ac.uk/research/research-projects/completed-projects/worn-again/> (Accessed: 10 June 2015).
- Ellen MacArthur Foundation (2014) *Towards the Circular Economy vol.3: accelerating the scale-up across global supply chains*. UK: Ellen MacArthur Foundation. Available at: <http://www.ellenmacarthurfoundation.org/business/reports/ce2014> (Accessed: 12 May 2015).
- Ellen MacArthur Foundation (2013) *Towards the circular economy vol.2 opportunities for the consumer goods sector*. UK: Ellen MacArthur Foundation. Available at: <http://www.ellenmacarthurfoundation.org/business/reports/ce2013> (Accessed: 6 March 2015).
- European Commission (2006) *Environmental impact of products (EIPRO) – Analysis of the life cycle environmental impacts related to the final consumption of the EU-25*. Spain: European Commission, Joint research centre, Institute for prospective technological studies (IPTS). Available from: http://ec.europa.eu/environment/ipp/pdf/eipro_annex.pdf (Accessed: 10 June 2015).
- Engelhardt, A. ed. (2010) *The fibre year 2009/10: a world survey on textile and nonwovens industry*. Germany: TextileGmbH & Co.
- European Commission (2007) *The 2020 Climate and Energy package*. Available at: http://ec.europa.eu/clima/policies/package/index_en.htm (Accessed: 6 March 2015).
- Goldsworthy, K., (2014a). *Growing a Circular Economy. The case for transforming the approach to waste and growing a circular economy; a design perspective*. <http://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee/inquiries/parliament-2010/growing-a-circular-economy/?type=Written#pnlPublicationFilter> (Accessed: Jun 24 2014).

- Greenpeace (2011) *Dirty laundry: unravelling the corporate connections to toxic water pollution in China*. Amsterdam: Greenpeace International.
- Gwozdz, W., Netter, S., Bjartmarz, T and Reisch A. L. (2013) *Survey Results on Fashion Consumption and Sustainability among Young Swedes*. Available at: <http://www.mistra.org/download/18.235dce8d1429b736de3406/1386697330067/Report+Mistra+Future+Fashion+Consumer+behaviour+2013.pdf> (Accessed 15 July 2015).
- Hennes & Mauritz (2014) *Conscious Actions Sustainable Reports*. Available at: <http://sustainability.hm.com/en/sustainability/downloads-resources/reports/sustainability-reports.html> (Accessed: June 19 2014).
- Høy Nygaard, H. (2015) *Sustainable Textile Production Tirupur, India: Final report from a multi-stakeholder pilot implementation project in the Nordic countries and Tirupur, India*. Available at: <http://norden.diva-portal.org/smash/get/diva2:800866/FULLTEXT01.pdf> (Accessed 15 July 2015).
- MISTRA (2011) *Future Fashion Research Project*. Available at: www.mistrafuturefashion.com (Accessed: 6 August 2012).
- Morley, N.J., Bartlett, C. and McGill I. (2009) *Maximising reuse and recycling of UK clothing and textiles: a research report to the Department for Environment, Food and Rural Affairs by Oakdene Hollins Ltd*. London: Department for Environment, Food and Rural Affairs.
- Murray, R (2002) *Zero waste*. London: Greenpeace Environmental Trust.
- Murray, R., Mulgan, G. and Caulier-Grice, J. (2010) *The Open book of social innovation*. London: NESTA, <http://www.nesta.org.uk/publications/open-book-social-innovation> [Accessed: June 24, 2014].
- Myrorna (2014) *Myrorna Insamlingsrapport 2014 (Myrorna Collection Report 2014)*. Available at: http://myrorna.se/wp-content/uploads/Myrorna_insamlingsrapport_2014.pdf (Accessed 15 July 2015).
- Nordic Council of Ministers, Nordic Council of Ministers Secretariat. (2015) *Well dressed in a clean environment: Nordic Action plan for sustainable fashion and textiles*. Available at: <http://norden.diva-portal.org/smash/get/diva2:819423/FULLTEXT01.pdf> (Accessed 15 July 2015).
- Palm, D. and Elander M. (2015) *The Nordic textile reuse and recycling commitment*. Available at: <http://norden.diva-portal.org/smash/get/diva2:788266/FULLTEXT01.pdf> (Accessed 15 July 2015).
- Palm, D., Elander, M., Watson, D., Kiørboe, N., Salmenperä, H., Dahlbo, K., Moliis, K., Lyng, K., Valente, C., Gíslason, S., Tekie, H. and Rydber, T. (2014) *Towards a Nordic textile strategy Collection, sorting, reuse and recycling of textiles*. Available at: <http://www.ivl.se/download/18.6cf6943a14637f76eab2776/1402668343852/C28+TN2014538+web.pdf> (Accessed 15 July 2015).
- Palm, D., Harris, S. and Ekvall, T. (2013) *Livscykelanalys av svensk textilekonsumtion, Underlagsrapport till Naturvårdsverkets regeringsuppdrag om nya etappmål. (Lifecycle analysis of Swedish textile consumption)*. Available at: <http://www.naturvardsverket.se/upload/miljoarbete-i-samhallet/miljoarbete-i-sverige/regeringsuppdrag/2013/etappmal2013forslag/etappmal2013forslag-textil-lca.pdf> (Accessed 15 July 2015).
- Rowson, J., (2011). *Transforming Behaviour Change: Beyond Nudge and Neuromania*, London: RSA.
- RSA (2014), *The Great Recovery*, <http://www.greatrecovery.org.uk/the-great-recovery-report/> [Accessed: June 24, 2014].
- WRAP (2012), *Valuing our Clothes*, Waste & Resources Action Programme (WRAP), www.wrap.org.uk/clothing. Accessed: September 22, 2014.

Online Resources and Lecture Transcriptions

- Ainsworth, D. (2010) *What is the Collective Wisdom Theory?* Available at: <http://www.collectivewisdominitiative.org/papers/ainsworth%20WhatIs.pdf> (Accessed: 23 August 2015).
- Aldersey-Williams, H. (2011) *The new tin ear: manufacturing, materials and the rise of the user-maker* [Keynote Lecture], Royal Society for the encouragement of Arts, Manufactures and Commerce. 28 March.
- Ballie, J. and von Busch, O. (2011) *Old Is the new black*. Available at: www.oldisthenewblack.tumblr.com (Accessed: 31 March 2014).
- Ballie, J. (2013) *Black Hack Chat digital mood board*. Available at: <http://www.pinterest.com/jenballie/black-hack-chat-blackhackchat/> (Accessed: 31 March 2014).
- Brody, J., Terrey, N. and Tergas, L. (2010) *Design Facilitation as an Emerging Design Skill: A Practical*

- Approach in Interpreting Design Thinking Conference Proceedings. Design Studies: The Interdisciplinary Journal of Design Research. Elsevier.
- Buchenau, M. and Suri, J. F. (2000) Experience prototyping. *DIS'00 proceedings of the 3rd conference on designing interactive systems: processes, practices, methods and techniques*. ACM, New York, pp. 424-433.
- Design Council (2011), *SIM 19: A Response to the House of Commons Science and Technology Committee inquiry into strategically important metals*
<http://www.publications.parliament.uk/pa/cm201012/cmselect/cmsctech/726/726we12.htm>
 (Accessed: 12 May 2015).
- Dewberry, E. (2011). *Developing an ecology of mind in design*. 18th International Conference on Engineering Design (ICED 11), 15-18 August, Copenhagen, Denmark.
- Earley, R., & Fletcher, K. (2003) *5Ways*. Available at: <http://www.5ways.info/docs/intro/intro.htm>
 (Accessed: 12 May 2015).
- Earley, R., (2007) *Ever & Again: Experimental Recycled Textiles*. Available at:
<http://www.everandagain.info> (Accessed: 12 May 2015).
- Earley, R. & Goldsworthy, K. (2008) *Twice upcycled shirts*. Available at:
<http://www.upcyclingtextiles.net/#/concert/> (Accessed: 2 June 2014).
- Earley, R. and Politowicz, K. (2010) *TED's TEN*. Available at: www.tedresearch.net (Accessed: 16 June 2012)
- Fashion Revolution (2013) *Fashion Revolution*. Available at: <http://fashionrevolution.org> (Accessed: 14th June 2014).
- FireUP (2014) *FireUp catalyst project 2 Dr Kate Goldsworthy*. Available at: <http://vimeo.com/99342391>
 (Accessed: July 25 2014).
- Fletcher, K. and Tham, M. (2007) *Lifetimes Project*. Available at: <http://www.katefletcher.com/lifetimes/>
 (Accessed: 6 March 2015).
- Higg Index (2012) *Sustainable apparel coalition*. Available at: <http://www.apparelcoalition.org/higgindex/>
 (Accessed: 27 February 2012).
- IDEO (2009) *Human Centred Design Toolkit*. Available at: <http://www.ideo.com/work/human-centered-design-toolkit/> (Accessed: 18 February 2012).
- Kimbell, L. (2013) *Mapping social design practice: beyond the toolkit*. Available at:
<http://mappingsocialdesign.org/2013/11/19/mapping-social-design-practice-beyond-the-toolkit/>
 (Accessed: 19 December 2014).
- Kimbell, L. (2009) 'Beyond design thinking: Design-as-practice and designs-in-practice', *CRESC Conference, Manchester*.
- Labour Behind the label (no date) Available at: <http://www.labourbehindthelabel.org/> (Accessed: 26 April 2012).
- Made-By (2009) *Benchmark for social standards*. Available at: <http://www.made-by.org/consultancy/tools/social/>
 (Accessed: 6 March 2015).
- Riel, M. (2010) *Center for collaborative action research*. Available at:
<http://cadres.pepperdine.edu/ccar/define.html> (Accessed: 21 February 2010).
- Norman, D. (2013) *Rethinking design thinking*. Available at:
http://www.core77.com/blog/columns/rethinking_design_thinking_24579.asp (Accessed: 6 March 2014).
- Pastor, E. and Van Patter, G. (2011) *NextDesign Geographies: Understanding Design Thinking*, New York: NextDesign Leadership Institute <http://issuu.com/nextd> Accessed: 15 October 2014
- Patagonia, *Common Threads*, <http://www.patagonia.com/us/patagonia.go?assetid=63753>. [Accessed: August 12, 2014].
- Riversimple, <http://riversimple.com/whole-system-design/> (Accessed: 6 May 2016).
- SoFok Studio (2013). *Black hack chat workshop at the 10th EAD Crafting the Future Design Conference in Gothenburg*. Available at: <http://vimeo.com/64294297> (Accessed: 31 March 2014).
- Sadowska, N. & Tham, M. (2004) The stored wisdom: artefacts as gap minders between the "professional self", the "personal self" and other individuals. *Working Papers in Art and Design 3*.
http://sitem.herts.ac.uk/artdes_research/papers/wpades/vol3/nsfull.html. Society for Organisational Learning, https://www.solonline.org/?page=Left_Hand_Column, Accessed: October 31, 2014.
- Thackara, J. (2010) *Doors of perception: the unwanted swatch*. Available at:
http://www.doorsofperception.com/archives/sustainability_design/ (Accessed: 14 January 2015).
- Varganti, R., What should we be teaching professional designers today? (Tuesday 21 September 2010) RSA, transcript of a debate at the RSA, <http://www.thersa.org/projects/design/reports/transcript-what-should-we-be-teaching-professional-designers-today>

Wikipedia (2012) *Hackathons*. Available at: <http://en.wikipedia.org/wiki/Hackathon> (Accessed: 29 May 2012).

Academic Theses

- Ballie, J. (2013) *eCo-textile design: how can textile design and making, combined with social media tools, achieve a more sustainable fast fashion future?* PhD thesis. University of the Arts London.
- Bang, A. L. (2010) *Emotional value of applied textiles: dialogue-oriented and participatory approaches to textile design*. PhD thesis. Kolding School of Design and Aarhus School of Architecture.
- Goldsworthy, K. (2012) *Laser-finishing: a new process for designing recyclability in synthetic textiles*. PhD thesis. University of the Arts London.
- Igeo, E. (2013) *In textasis: matrixial narratives of textile design*. PhD thesis. Royal College of Art.
- Rao, P. (2012) *Connecting the dots: a design approach to services for the poor*. PhD thesis. Northumbria University
- Andersen, K.R. (2015) *Stabilizing Sustainability in the Textile and Fashion Industry*. PhD thesis. Copenhagen Business School.
- Seravalli, A. (2014) *Making commons: attempts at composing prospects in the opening of production*. PhD thesis. Malmo University.
- Tan, L. (2012) *Understanding the different roles of the designer in design for social good. A study of design methodology in the Dott 07 (Designs of the Time 2007) project*. PhD Thesis, Northumbria University.
- Tham, M. (2008) *Lucky people forecast – a systematic futures perspective on fashion and sustainability*. PhD thesis. Goldsmith University.
- Twigger Holroyd, A. (2013) *Folk fashion: amateur re-knitting as a strategy for sustainability*. PhD thesis. Birmingham City University.
- von Busch, O. (2008) *Fashion-able: hacktivism and engaged fashion design*. PhD thesis. University of Gothenburg.

Exhibitions

- Ever & Again* (2007) [Exhibition]. Chelsea College of Arts, London. 19 – 25 October 2007.
- Swedish Fashion: 2000-2015* (2014) [Exhibition]. Sven-Harrys Konstmuseum, Stockholm. 23 May - 31 August 2014.
- Well Fashioned* (2006) [Exhibition]. Crafts Council, London.

appendix 4 – project logistics

summary of reach and dissemination activities

The impact of the project was measured through 23 workshops in 5 countries, reaching 321 designers. 221 of these designers were from industry including large, medium and small companies, in total reaching 78 brands. Of these 78 brands, we reached 30 Swedish brands through the SFA and H&M workshops alone, while conference workshops created much higher numbers.

Web Platform

Together with the website platform Textile Toolbox, the project research and dissemination strategy reached 15 countries including UK, Sweden, US, Hong Kong, Germany, Denmark, Australia, France, Norway, India, Canada, Brazil, Italy, China and New Zealand. From the web platform launch until project end on 31 May 2015 we had 75,028 page views (hits) and 31,449 sessions (visits).

Exhibition

We toured the exhibition to 9 locations and 5 countries over 8 months. Cities where the work was 'popped-up' included London, Glasgow, Borås, Copenhagen and New York. We showcased the work at DAFI (Denmark), Dundee University (Design in Action / AHRC), Zero Waste Scotland, Falmouth University, Central Saint Martins, RSA and The Great Recovery (Resource, Trade Show, Circular Economy), SP Symposium Fashion Textile Centre in Borås, London Innovation Forum, FIT New York, and Uppsala Hemslöjssföreningens (Crafts Council) 100-year Jubilee Exhibition. An audience of 350 people was reached directly through the attendance at Pop Up events. Individual exhibits were also showcased at the Green exhibition at the Whitworth Art Gallery in Manchester, Milan Furniture Fair, Almedalsveckan in Visby (Sweden) and Walford Mill Crafts in Dorset; reaching a much larger audience through an event-based and permanent collection setting.

Workshops

100 designers were reached in educational institutions through emerging designer workshops. As an outcome, we have gathered data of 61 redesign concepts that demonstrate the sustainability improvement in design achieved through using the workshops tools. We created 23 new workshop tools and the TEN cards have been translated into 3 languages. Differentiating between the needs of each stakeholder, we have created 12 workshop tools for large companies, 5 workshop tools for SME's and 3 tools for emerging designers.

Academic Publishing

The project's academic reach was achieved through 49 international platforms. These included conference presentations, industry presentations, academic keynotes and educational lectures. We published 8 peer-reviewed publications in 4 countries (Sweden, UK, France, Norway).

PhD Project

The impact of the PhD research occurred through a combination of three international educational workshops; academic publishing and exhibitions of five artifacts and two concepts. The artifacts and concepts were disseminated to industry through an innovation exhibition for an apparel group in the US, and internationally through the Textile Toolbox online exhibition. The creative concepts were also disseminated through dialogue and interviews with Swedish fashion brands, and the PhD Researcher's involvement in training programmes for Swedish designers. Seventy additional emerging designers were reached through the PhD researcher's international workshops.

The research produced two peer-reviewed conference papers; one peer-reviewed co-authored conference paper; and a co-authored book chapter. Three texts on design and ethical production were written for a general audience on the Textile Toolbox platform. The Researcher also conducted six interviews with designers and other stakeholders.

The Researcher devised and facilitated five educational workshops in Sweden, London, China and Australia; and two workshops in a conference context. Two Digital Resources were developed as outcomes from the data gathered. Throughout the PhD project period the researcher developed and delivered lecture and workshop material for students in textiles at UAL, and to projects within fine art and other design fields. In Year 3 (2013) the Researcher was appointed a Visiting PhD Fellow at the Design, Architecture and the Built Environment (DAB) department at University of Technology Sydney (UTS); and involved in teaching and lectures to under-graduate and post-graduate students.

Additional Outcomes

Touring Exhibition (Figure 110)

The original proposal included an exhibition of new design artefacts to be showed in an online showcase. With additional funding and support, TED were able to make this into a physical exhibition and tour it to venues internationally. Physical prototypes were shown to audiences in London, Glasgow, Stockholm, Copenhagen, Sweden, and New York. Additional funding acquired to support this tour came from UAL (TFRC, CCW and CSM); DAFI (Denmark); Dundee University (Design in Action / AHRC); Zero Waste Scotland; Falmouth University; RSA and The Great Recovery (Resource, Trade Show, Circular Economy); FIT and MFIT New York; and Uppsala Hemslöjssföreningens (Crafts Council) 100-year Jubilee Exhibition, Uppsala, Sweden. Additional prototypes were created through projects funded by Mistra Future Fashion strategic funding, CCW, Northampton University. (Shanghai Shirts I, II & Redressing Activism (Earley, Dodd, Harvey, Child, Spurgin, 2014))

Book Chapters for School Children

Additional outcomes also sought to broaden the audience for the research. These included the following book chapters: 'Holistic Fashion Design' (Earley & Vuletich, 2015) in 'Fashion Design for the Curious: Why Study Fashion Design', by Kishor Vaidya, Curious Academic Publishing: Canberra (ISBN: 978-1-925128-55-0) for secondary school children; and for primary school teachers - Earley, R., Harvey, B. (2015) 'Elastic Learning Tools', in 'Cultures of Resilience', Hato Press: London.



Figure 110: Exhibition pop up from top left, moving clock wise: Chelsea College of Arts, Fashion Textile Centre Borås, Zero Waste Scotland, and Shanghai Shirt II in New York, at FIT, June 2015.

outputs and dissemination record

Web Platform and Exhibition

- Aspinall, M. (2013) 'Cash for clothing – has much changed?', Textile Toolbox, 7 May. Available at: <http://www.textiletoolbox.com/research-writing/cash-clothing-has-much-changed/>.
- Aspinall, M. (2013) 'November in Florence', Textile Toolbox, 20 February. Available at: <http://www.textiletoolbox.com/research-writing/design-looks-models-history/>.
- Aspinall, M. (2012) 'Design that looks at models from history and nature', Textile Toolbox, 7 Oct. Available at: <http://www.textiletoolbox.com/research-writing/>.
- Ballie, J. (2014) 'New service models for fashion production and consumption', Textile Toolbox, 19 Nov. Available at: <http://www.textiletoolbox.com/research-writing/new-service-models-fashion-production-and-consumpt/>.
- Bowles, M. (2014) 'Hot of the press', Textile Toolbox, 29 Sep. Available at: <http://www.textiletoolbox.com/research-writing/hot-press/>.
- Brown, S. (2013) 'Post consumer waste', Textile Toolbox, 22 Jul. Available at: <http://www.textiletoolbox.com/research-writing/post-consumer-waste/>.
- Brown, S. (2013) 'Pre consumer waste', Textile Toolbox, 23 Apr. Available at: <http://www.textiletoolbox.com/research-writing/pre-consumer-waste/>.
- Brown, S. (2013) 'Design for recycling/ upcycling', Textile Toolbox, 5 Feb. Available at: <http://www.textiletoolbox.com/research-writing/design-recycling-upcycling/>.
- Chapman, J. (2013) 'Repair', Textile Toolbox, 22 Jul. Available at: <http://www.textiletoolbox.com/research-writing/repair/>.
- Chapman, J. (2013) 'Design to reduce the need to consume', Textile Toolbox, 20 Feb. Available at: <http://www.textiletoolbox.com/research-writing/design-reduce-the-need-consume-2/>.
- Chapman, J. (2012) 'Design to reduce the need to consume', Textile Toolbox, 7 Aug. Available at: <http://www.textiletoolbox.com/research-writing/design-to-reduce-the-need-to-consume/>.
- Earley, R. (2014) 'Textile Toolbox open call', Textile Toolbox, 17 Dec. Available at: <http://www.textiletoolbox.com/research-writing/textile-toolbox-open-call/>.
- Earley, R. (2014) 'The TEN animations are now live', Textile Toolbox, 15 Oct. Available at: <http://www.textiletoolbox.com/research-writing/ten-animations-are-now-live/>.
- Earley, R. (2014) '10th EAD Crafting the Future Conference', Textile Toolbox, 14 Jan. Available at: <http://www.textiletoolbox.com/research-writing/10th-ead-crafting-future-conference/>.
- Earley, R. (2014) 'TFRC's material futures publication wins design week's best editorial design award 2013', Textile Toolbox, 14 Jan. Available at: <http://www.textiletoolbox.com/research-writing/tfrcs-material-futures-publication-wins-design-week/>.
- Earley, R. (2014) 'Design intelligence: fashion' New York City', Textile Toolbox, 14 Jan. Available at: <http://www.textiletoolbox.com/research-writing/design-intelligence-fashion-new-york-city/>.
- Earley, R. (2014) 'TED's 24 – Summer workshop', Textile Toolbox, 14 Jan. Available at: <http://www.textiletoolbox.com/research-writing/teds-24-summer-workshop/>.
- Earley, R. (2014) 'TFRC Research campfires', Textile Toolbox, 14 Jan. Available at: <http://www.textiletoolbox.com/research-writing/tfrc-research-campfires/>.
- Gwilt, A. (2013) 'Meeting new consumer needs', Textile Toolbox, 17 Sep. Available at: <http://www.textiletoolbox.com/research-writing/meeting-new-consumer-needs/>.
- Gwilt, A. (2013) 'Production models', Textile Toolbox, 23 Apr. Available at: <http://www.textiletoolbox.com/research-writing/production-models/>.
- Gwilt, A. (2013) 'Synergies', Textile Toolbox, 19 Mar. Available at: <http://www.textiletoolbox.com/research-writing/synergies/>.
- Harper, K. (2013) 'Aesthetic strategy', Textile Toolbox, 7 May. Available at: <http://www.textiletoolbox.com/research-writing/aesthetic-strategy/>.
- Harper, K. (2013) 'The aura of things', Textile Toolbox, 18 Mar. Available at: <http://www.textiletoolbox.com/research-writing/aura-things/>.

- Harper, K. (2012) 'Aesthetic sustainability', Textile Toolbox, 17 Dec. Available at: <http://www.textiletoolbox.com/research-writing/aesthetic-sustai/>.
- MacLennan, S. (2014) 'Initiatives to reduce chemical impacts', Textile Toolbox, 2 Dec. Available at: <http://www.textiletoolbox.com/research-writing/chemical-initiatives/>.
- MacLennan, S. (2014) 'Chemical reduction', Textile Toolbox', 14 Oct. Available at: <http://www.textiletoolbox.com/research-writing/chemical-reduction/>.
- MacLennan, S. (2012) Design to reduce chemical impacts', Textile Toolbox', 7 Aug. Available at: <http://www.textiletoolbox.com/research-writing/design-to-reduce-chemical-impact/>.
- Ribul, M. (2014) 'Ecosystems', Textile Toolbox, 30 Oct. Available at: <http://www.textiletoolbox.com/research-writing/ecosystems/>.
- Rigby, E. (2013) 'Collaborations', Textile Toolbox, 7 May. Available at: <http://www.textiletoolbox.com/research-writing/collaborations/>.
- Rigby, E. (2013) 'Laundry behavior', Textile Toolbox, 5 Mar. Available at: www.textiletoolbox.com/research-writing/design-reduce-energy-and-water-part-2/.
- Rigby, E. (2012) 'Design to reduce energy and water use', Textile Toolbox, 7 Oct. Available at: <http://www.textiletoolbox.com/research-writing/design-reduce-energy-water-use/>.
- Rissanen, T. (2014) 'Fashion design, time and waste', Textile Toolbox, 11 Jun. Available at: <http://www.textiletoolbox.com/research-writing/fashion-design-time-and-waste/>.
- Rissanen, T. (2013) 'Design lean', Textile Toolbox, 23 Apr. Available at: <http://www.textiletoolbox.com/research-writing/designing-lean/>.
- Rissanen, T. (2012) 'Design to minimise waste', Textile Toolbox, 17 Dec. Available at: <http://www.textiletoolbox.com/research-writing/design-minimise-waste/>.
- von Busch, O. (2013) 'Design alternatives', Textile Toolbox, 22 Jul. Available at: <http://www.textiletoolbox.com/research-writing/design-alternatives/>.
- von Busch, O. (2013) 'Design agonism', Textile Toolbox, 24 Jun. Available at: <http://www.textiletoolbox.com/research-writing/design-agonism/>.
- von Busch, O. (2012) 'Design activism', Textile Toolbox, 13 Nov. Available at: <http://www.textiletoolbox.com/research-writing/design-activism/>.
- Vuletich, C. (2014) 'Design and garment production', Textile Toolbox, 24 Nov. Available at: <http://www.textiletoolbox.com/research-writing/design-and-garment-production/>.
- Vuletich, C. (2014) 'Production Contexts' Textile Toolbox, 30 Apr. Available at: <http://www.textiletoolbox.com/research-writing/production-contexts/>.
- Vuletich, C. (2012) 'Design for ethical production' Textile Toolbox, 3 Dec. Available at: <http://www.textiletoolbox.com/research-writing/design-ethical-production/>.

Exhibition Design Items

- Bowles, M. and Round, K. (2014) Smorgasboard [Skirt, shirt and scarves]. Available at: <http://www.textiletoolbox.com/exhibits/detail/smorgasboard/>.
- Earley, R. (2013) Fast ReFashion [Shirt and film]. Available at: <http://www.textiletoolbox.com/exhibits/detail/fast-refashion/>.
- Earley, R. and Dodd, I. (2014) Shanghai Shirt [Heat transfer print on polyester shirt]. Available at: <http://www.textiletoolbox.com/exhibits/detail/shanghai-shirt/>.
- Earley, R., Harvey, B. and Child, E. (2014) Redressing Activism [Headpiece, Shirt, skirt and shoes]. Available at: <http://www.textiletoolbox.com/exhibits/detail/redressing-activism/>.
- Goldsworthy, K. (2014) Seamsdress [Dress and samples]. Available at: <http://www.textiletoolbox.com/exhibits/detail/seamsdress/>.
- Harvey, B. (2014) A Jumper to Mend, A Jumper to Lend [Mended jumper and kit]. Available at: <http://www.textiletoolbox.com/exhibits/detail/jumper-lend-jumper-mend/>.
- Landalv, J. (2014) Sweaver [Collection of woven samples]. Available at: <http://www.textiletoolbox.com/exhibits/detail/sweaver/>.

Politowicz, K. and Goldsworthy, K. (2014) A.S.A.P Paper Cloth [Jacket and samples] in collaboration with Dr. Hjalmar Granberg, Sandy MacLennan, David Telfer. Available at: <http://www.textiletoolbox.com/exhibits/detail/sp-paper-cloth/>.

Ribul, M. (2014) DeNAture [Shirt, book and film]. Available at: <http://www.textiletoolbox.com/exhibits/detail/denature/>.

Exhibition Tour Details

Chelsea College of Arts, London. 13 – 14th November 2014.

Textile Symposium, Zero Waste Scotland & Scottish Textile & Leather Association (STLA), Design in Action, Glasgow. 20th November 2014.

Knit 1, Mend 1, Keep 1, Change 1, Walford Mill Crafts, Dorset. 17th January – 1st March 2015.

MA Material Futures, Central Saint Martins, UAL, London, 28th January 2015.

Green, Whitworth Art Gallery, Manchester. 14th February 2015.

RSA and The Great Recovery, Resource Event, Excel, London. 3rd March 2015.

London Innovation Forum, London 16 – 17th March 2015.

Milan Furniture Fair, Milan, Italy. 12th-17th April 2015.

DAFI, Copenhagen, Denmark. 16-17th April 2015.

SP symposium, Fashion Textile Centre, Borås, Sweden. 27th April 2015.

Falmouth University, Falmouth. 28th April 2015.

Uppsala Hemslöjssföreningens (Crafts Council) 100-year Jubilee Exhibition. Uppsala, Sweden. 22nd May 2014.

Fashion Institute of Technology (FIT), New York. 8 – 19th June 2015.

Almedalsveckan, Visby, Sweden. 28th June – 5th July 2015.

Online Project Resources

The TEN CARDS

Earley, R. and Politowicz, K. (2013) The TEN cards in English. Available at:

<http://www.textiletoolbox.com/media/uploads/resources-pdf/ted-the-ten-cards-english.pdf>

Earley, R. and Politowicz, K. (2013) The TEN cards in Swedish. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-the-ten-cards-swedish.pdf>.

Earley, R. and Politowicz, K. (2013) The TEN cards in traditional Chinese. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-the-ten-cards-traditional-chinese.pdf>.

Earley, R. and Politowicz, K. (2013) The TEN cards in simplified Chinese. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-the-ten-cards-simplified-chinese.pdf>.

WORKSHOPS FOR THE GENERAL PUBLIC

Harvey, B. (2014), Mending for Others. Available at:

<http://www.textiletoolbox.com/media/uploads/resources-pdf/ted-mending-for-others01.pdf>.

WORKSHOPS FOR PRIMARY SCHOOLS

Earley, R. (2015) Who Made My Uniform?. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-who-made-my-uniform-10-pdf.pdf>.

Bowles, M. and Round, K. (2015) The Smorgas Board Game. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-smorgas-board-game-11-pdf.pdf>.

WORKSHOPS FOR SECONDARY SCHOOLS

Politowicz, K. (2015) Tell Us About Your Clothes. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-tell-us-about-your-clothes-05.pdf>.

WORKSHOPS FOR BA PROGRAMMES

Earley, R. (2015) The Burn Test. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-burn-test-04.pdf>.

Child, E. (2014) Patch Skirt Project. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-patch-skirt-project-03.pdf>.

WORKSHOPS FOR MA PROGRAMMES

Politowicz, K. (2015) Elective Project & Workshops 1: A Manifesto for Design Innovation. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-a-manifesto-for-design-innovation-06.pdf>.

Politowicz, K. (2015) Elective Project & Workshops 2: Creative Writing for Design Innovation. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-creative-writing-for-design-innovation-07.pdf>.

Earley, R. (2015) Textile Toolbox Pop Up Workshop. Available at: <http://www.textiletoolbox.com/media/uploads/resources-pdf/ted-textile-toolbox-pop-up-workshop-09-pdf.pdf>

WORKSHOPS FOR DESIGN STAFF TRAINING IN SME COMPANIES

Vuletic, C. (2014) Sutra Stitching. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-sutra-stitching-02b.pdf>.

WORKSHOPS FOR DESIGN STAFF TRAINING IN CORPORATIONS

Earley, R. (2015) Sustainable Design Inspiration Programme. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-sustainable-design-inspiration-programme-08.pdf>.

Earley, R. (2015) Textile Toolbox Pop Up Workshop. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-textile-toolbox-pop-up-workshop-09-pdf.pdf>.

WORKSHOP TOOLS for LARGE COMPANIES

Earley, R. (2013) The TED RED BOX. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/01-ted-red-box-textile-toolbox-red-logo.pdf>.

Earley, R. (2013) Feedback Postcards. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/05-ted-inspirational-cards-template-red-logo.pdf>.

Earley, R. (2013) Now Stamp. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/03-ted-now-stamp.pdf>.

Earley, R. (2013) Near Stamp. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/03-ted-near-stamp.pdf>.

Earley, R. (2013) Far Stamp. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/03-ted-far-stamp.pdf>.

Earley, R. & Goldsworthy, K. (2013) Lifecycle Map. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/04-ted-lifecycle-map-textile-toolbox-red-logo.pdf>.

Earley, R. (2013) Inspirational Industry Ideas [Case study cards] Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/05-ted-inspirational-cards-template-red-logo.pdf>.

Earley, R. (2013) Thinking Together Worksheet. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/06-ted-thinking-together-worksheet-textile-toolbox-red-logo.pdf>.

Earley, R. and Ribul, M. (2013) Barriers and Opportunities Work Sheet. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/07-ted-barriers-and-opportunities-worksheet-textile-toolbox-red-logo.pdf>.

- Earley, R. and Ribul, M. (2013) Audit Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/08-ted-audit-worksheet-textile-toolbox-red-logo.pdf>.
- Earley, R. and Ribul, M. (2013) Redesign Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/09-ted-redesign-worksheet-textile-toolbox-red-logo.pdf>.
- Earley, R. and Ribul, M. (2013) Garment Checklist. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/10-ted-garment-checklist-textile-toolbox-red-logo.pdf>.

WORKSHOP TOOLS for SME's

- Earley, R. and Ribul, M. (2012) TED Strategies Audit Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-strategies-audit-red-logo.pdf>.
- Earley, R. and Ribul, M. (2012) TED Redesign Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted--redesign-sheet-textile-toolbox-red-logo.pdf>.
- Earley, R., Vuletich, C. and Ribul, M. (2013) TED & Higg Index Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-higg-index-audit-sheet-textile-toolbox-red-logo.pdf>.
- Earley, R. and Ribul, M. (2014) Barriers and Opportunities Worksheet. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-barriers-and-opportunities-sheet-textile-toolbox-red-logo.pdf>.
- Earley, R. and Vuletich, C. (2013) TED Question Cards. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-q-cards-print.pdf>.

WORKSHOP TOOLS for EDUCATION OF EMERGING DESIGNERS

- Politowicz, K. (2012) A Manifesto for Strategic Change. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-manifesto-textile-toolbox-v2-red-logo.pdf>.
- Politowicz, K. and Ribul, M. (2013) Question Diagram. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/ted-question-diagram-textile-toolbox-red-logo.pdf>.
- Von Busch, O. (2013) Zines Instruction. Available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-zine-format-instruction.pdf>.

PROJECT DATA SETS

- Earley, R. (2013) Sustainable Design Inspiration for H&M – 100 great ideas. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/sustainable-design-inspiration-for-h&m-100.pdf>.
- Ribul, M. (2015) Case studies Textile Toolbox. Available at:
<http://textiletoolbox.com/media/uploads/resources-pdf/data-set---case-studies-textile-toolbox.pdf>.

TRANSCRIPTIONS

- Earley, R. (2011) TED's TEN [Presentation], London Fashion Colloquia, London Fashion Week. London College of Fashion. 21-22 September. Available on request from ted@chelsea.arts.ac.uk
- Earley, R. (2012) Thinking Big and Making It Real: 50 ways to make stuff better (or better stuff) [Presentation], PUMA Sustainable Design Collective. Puma London headquarters, 7 June.
- Earley, R. (2013) Sustainable Design Inspiration for H&M [Training program including 6 lectures to members of staff at H&M] Hennes &Mauritz (H&M). Stockholm, 18 June.
- Politowicz, K. (2013) Design Lifetimes: A Manifesto for Strategic Change [Professorial Platform lecture]. Chelsea College of Arts, London, 17 July. Available on request from ted@chelsea.arts.ac.uk
- Earley, R. (2014) The 'i' in the Textile Toolbox Team [Keynote speech], Transition: Re-thinking textiles and surfaces. University of Huddersfield. 26 November. Available at:

<http://textiletoolbox.com/media/uploads/resources-pdf/ted-transcription-huddersfield-becky-earley.pdf>.

Politowicz, K. and Goldsworthy, K. (2014) Practice, Prototypes and Collaboration: towards systemic change in the textile industry [Lecture]. Parsons the New School for Design, New York, 29 January. Available on request from ted@chelsea.arts.ac.uk

Earley, R. and Goldsworthy, K. (2015) webinar, Design in Action – Chiasma, 28 March. Available on request from ted@chelsea.arts.ac.uk

Industry Workshops

Earley, R. (2014) Sustainability, Usability, Recyclability, Redress Forum 2014. Hong Kong, 26 – 27 January.

Earley, R. (2015) Sustainable Design Thinking and TED's The TEN, Fabric Source Session - Design Strategy – How to use TEDs TEN. DAFI, Copenhagen, 16 – 17 April.

Earley, R. (2015) Sustainable Design Thinking and TED's The TEN, Sustainability and Textiles: Reinvention and Innovation. Summer Institute, Fashion Institute of Technology, FIT, 10 June.

Goldsworthy, K. and Ribul, M. (2015) Textile Toolbox, Round the Kitchen Table. RSA & The Great Recovery, Resource Event, Excel London, 3 March.

Conference Workshops

Earley, R. (2013) Black Hack Chat [Workshop], EAD10 Crafting the Future European Design Conference: peer reviewed workshop proposal. Gothenburg, Sweden, 17 – 19 April.

Goldsworthy, K. and Vuletich, C. (2013) Designing for Closed Loop Systems Workshop: A Textile Design Intervention [Workshop], MISTRA Future Fashion Symposium: Sustainability and Producer Responsibility in Textiles. Malmo, Sweden. 29 May.

Ribul, M. and Harvey, B. (2014) Label It – a workshop in sustainable design thinking [Workshop], P1 business-academic collaboration on sustainability in the fashion supply chain. Copenhagen Business School. 25 April.

International Educational Workshops

Earley, R. (2014) Fast ReFashion – Printed Polyester Workshop at Konstfack [Workshop] Konstfack College of Arts, Crafts and Design, Stockholm, 22 May.

Earley, R. and Politowicz, K. (2012) TED Redesign workshop [Workshop] MA Research Focus Group, Chelsea College of Arts, 18 April.

Goldsworthy, K. (2013) The TEN Coding MA Textile Design. Chelsea College of Arts, 6 November.

Goldsworthy, K. and Politowicz, K. (2014) 0 Waste+. [Workshop] Parsons The New School for Design, New York, 29 January.

Politowicz, K. (2014) Creative Writing for Design Innovation [Workshop] Konstfack College of Arts, Crafts and Design, Stockholm, 10-11 March.

Politowicz, K. (2013) A Manifesto for Design Innovation [Workshop] Konstfack College of Arts, Crafts and Design, Stockholm, 16 March.

Ribul, M. (2014) Resources [Workshop]. Youth Fashion Summit, Copenhagen, 22 - 23 April.

TED (2014) Zero Waste seminar and master class [Workshop]. Chelsea College of Arts, London, 28 March.

Academic Publishing

Earley, R. and Ballie, J. (2014) 'The Black Hack Chat', workshop précis in: von Busch ed. EAD Conference Workshop. The Design Journal, special edition from the European Academy of Design Conference titled 'Crafting the Future', vol. 17, issue 3, pp.370-401 (23).

Earley, R. and Goldsworthy, K. (2015) 'Designing for Fast and Slow Circular Fashion Systems: Exploring Strategies for Multiple and Extended Product Cycles.' PLATE: Product Lifetimes and the Environment. Nottingham, UK, 17- 19 June.

- Earley, R., Hadridge, P., Vuletich, C. and Andersen, K. (2015) 'A New 'T' for Textiles: Training design researchers to Inspire Buying Office Staff Towards Sustainability at Hennes and Mauritz (H&M)' EAD11: The Value of Design Research. Paris Descartes University - Paris College of Art – ISTE Paris, Paris & Boulogne sur Seine France, 22 – 24 April.
- Earley, R., and Harvey, B. (2015) 'Elastic Learning Tools' in Cultures of Resilience by Manzini E. and Till J. (eds). Hato Press: London.
- Goldsworthy, K. (2013) 'Design for Cyclability: Pro-active approaches for maximising material recovery.' Proceedings for Making Futures conference. Plymouth, UK, 26 – 27 September. Plymouth: Plymouth College of Art. Available at: http://www.plymouthart.ac.uk/documents/Goldsworthy__Kate.pdf (Accessed: 29 April 2015).
- Politowicz, K. and Earley, R. (2013) 'We Shape Our Tools: Then They Shape Us.' Proceedings of Cumulus - Praxis and Poetics conference. Northumbria, UK, 3-5 September. Newcastle upon Tyne: Northumbria University, pp. 176-179. Available at: <http://www.praxisandpoetics.org/researchthroughdesign/wp-content/uploads/sites/3/PraxisPoeticsRTD-Proceedings.pdf> (Accessed: 29 April 2015). (Conference POSTER available at: <http://textiletoolbox.com/media/uploads/resources-pdf/ted-poster-cumulus.jpg>).
- Goldsworthy, K. and Paine, H. (2014) 'Visions for Future Manufacturing.' Proceedings of All Makers Now? Craft Values in 21st Century Production conference. Falmouth University, Falmouth, 10-11 July.
- Reitan Andersen, K. and Earley, R. (2014) 'Design Thinking for Sustainability; A Case Study of a Research Project between H&M and the Textiles Environment Design Project.' Proceedings of the 20th Annual International Sustainable Development Research conference (ISDR). Trondheim, Norway, 18 - 20 June. Available at: http://www.academia.edu/12066169/DESIGN_THINKING_FOR_SUSTAINABILITY_A_CASE_STUDY_OF_A_RESEARCH_PROJECT_BETWEEN_HENNES_and_MAURITZ_AND_TEXTILES_ENVIRONMENT_DESIGN (Accessed: 29 April 2015).

PhD Project Publishing

- Earley, R., Hadridge, P., Vuletich, C. and Andersen, K. (2016) 'A New 'T' for Textiles: Training design researchers to Inspire Buying Office Staff Towards Sustainability at Hennes and Mauritz (H&M)', The Design Journal, Berg: London
- Earley, R. and Vuletich, C. (2015) 'Holistic Fashion Design', in Vaidya, K. (ed.) Fashion Design for the Curious: Why Study Fashion Design. Canberra: Curious Academic Publishing.
- Vuletich, C. (2015) 'Inner/Outer: A Practice-Based Exploration of Characteristics and Values for Sustainable Textile Design in Fashion', unpublished PhD thesis. University of the Arts London.
- Vuletich, C. and Harvey, B. (2014) Post-Carbon Design for a Sustainable Laustiz [Workshop]. KH Weissensee, Berlin, 30 April.
- Vuletich, C. (2014) 'Design and garment production', Textile Toolbox, 24 Nov. Available at: <http://www.textiletoolbox.com/research-writing/design-and-garment-production/> (Accessed 14 July 2015).
- Vuletich, C. (2014) 'Production contexts', Textile Toolbox, 30 Apr. Available at: <http://www.textiletoolbox.com/research-writing/production-contexts/> (Accessed 14 July 2015).
- Vuletich, C. (2014) 'Sustainable Textile Design as Bricolage.' Proceedings of in a Reverse Fashion: A Critical Agenda for Sustainable Fashion. Centre for Fashion Studies, Stockholm University, Stockholm, Sweden, 19 - 20 May. Available at: http://www.academia.edu/7707960/Sustainable_Textile_Design_as_bricolage (Accessed: 29 April 2015).
- Vuletich, C. (2014) Inner/Outer Jacket. [Quilted jacket]. Available at: <http://www.textiletoolbox.com/exhibits/detail/innerouter-jacket/> (Accessed: 29 April 2015).
- Vuletich, C. (2014) Sutra Stitching [Workshop] Flourish Fashion Festival. Sydney, Australia, 29 November.
- Vuletich, C. (2013) 'We are disruptive: New practices for the Textile/Fashion Designer in the Supply Chain.' Proceedings of EAD10 Crafting the Future European Design conference, Gothenburg, Sweden, 17 – 19 April. Available at:

<http://www.academia.edu/5690575/We_Are_Disruptive_New_Practices_for_Textile_and_Fashion_Designers_in_the_Supply_Chain> (Accessed: 29 April 2015).

Vuletich, C. (2012) 'Design for ethical production', Textile Toolbox, 3 Dec. Available at:

<http://www.textiletoolbox.com/research-writing/design-ethical-production/> (Accessed 14 July 2015).

Vuletich, C. (2012) Design for Change [3 bags and film]. North Carolina: Futurewear - VF Corporation. 20 - 21 March.

Conference Presentations

Earley, R. (2011) TED's TEN [Presentation], London Fashion Colloquia, London Fashion Week. London College of Fashion. 21-22 September.

Earley, R. and Politowicz, K. (2012) The TEN: A Tool for Narrative Prototypes [Presentation], SHARE 2 - conducting artistic research in industry linkage. Chelsea College of Arts, London, 11-12 May.

Earley, R. and Politowicz, K. (2012) MISTRA Future Fashion [Presentation], Designboost: Design Intelligence: Fashion. Parsons the New School for Design, New York. 17 - 20 September.

Earley, R. (2013) MISTRA Future Fashion [Presentation], University of the Arts London: transitions/behaviours/paradigm shifts: Debates in Enterprise and Sustainability. St Bride's Foundation, London. 15 May.

Earley, R. and Goldsworthy, K. (2015) 'Designing for Fast and Slow Circular Fashion Systems: Exploring Strategies for Multiple and Extended Product Cycles.' PLATE: Product Lifetimes and the Environment. Nottingham, UK, 17- 19 June.

Earley, R. (2014) The 'i' in the Textile Toolbox Team [Keynote speech], Transition: Re-thinking textiles and surfaces. University of Huddersfield. 26 November.

Earley, R. (2015) A New 'T' for Textiles: Training Design Researchers to Inspire Buying Office Staff Towards Sustainability at Hennes and Mauritz (H&M) [Presentation], EAD11, The Value of Design Research. Paris Descartes University, Paris College of Art, ISTE Paris, Paris. 23 April.

Goldsworthy, K. (2015) Designing for a circular fashion economy: technology, collaboration and creativity [Presentation], Cycle Faconner Lecture Series, Forging the Future. Ecole Nationale Supérieure des Arts Decoratifs (ENSAD), Paris, 30 March.

Goldsworthy, K. (2015) Designing for a Circular Fashion Economy: technology, collaboration and creativity [Presentation], Fashion & Textiles Institute Research Lecture Series 2014-15, Falmouth University, Falmouth. 27 April.

Ribul, M. (2014) Design possibilities for regenerated cellulose materials [Presentation and Poster], COST FP1205 Workshop - Science and uses of nanocellulose - cellulose foams and films: poster presentation. Biocomposites Centre, Bangor, Wales 5-6 March.

Ribul, M. (2014) DeNAture [Presentation], Transition: Re-thinking textiles and surfaces. University of Huddersfield. 27 November.

Industry Presentations

Earley, R. (2012) Strategies for sustainable fashion and textiles manufacture [Presentation], Future of Fashion Retail. Arup, London. 7 March.

Earley, R. (2012) Thinking Big and Making It Real: 50 ways to make stuff better (or better stuff) [Presentation], PUMA Sustainable Design Collective. Puma London headquarters, 7 June.

Earley, R. (2012) TFRC [Presentation] Material Futures publication launch. Central Saint Martins, London, 29 November.

Earley, R. (2013) Sustainable Design Inspiration for H&M [Training program including 6 lectures to members of staff at H&M] Hennes & Mauritz (H&M). Stockholm. 24 April, 24 May, 18 June.

Earley, R. and Politowicz, K. (2011) TED's TEN strategies for sustainable design [Presentation in front of CEOs from VF Corporation], MIT, Boston. 15 September.

Earley, R. (2015) The Textile Toolbox [Presentation], Sustainability and Textiles: Reinvention and Innovation. Summer Institute, Fashion Institute of Technology, FIT, 8 - 11 June.

- Earley, R. (2014) New Technologies are killing hand-made craft [Debate panelist]. Nottingham Trent University, Nottingham, 19 November.
- Earley, R. (2014) Textile Toolbox [Presentation], Scottish Textile Symposium. Zero Waste Scotland: Design in Action, Glasgow, 20 November.
- Earley, R. (2015) The Textile Toolbox: Sustainable Textile Strategies for C21st Designers [Presentation] Beyond Trends in Sustainability. The Textile Institute, London, 24 April.
- Earley, R. (2015) The Textile Toolbox: Sustainable Textile Strategies for C21st Designers [Presentation] SP Technical Research Institute of Sweden: The Forest on the Catwalk. Fashion Textile Centre, Borås, 27 April.
- Goldsworthy, K. (2014) The case for transforming the approach to waste and growing a circular economy; a design perspective [Written Evidence & Panel], Growing a Circular Economy: Parliamentary Environmental Audit Committee. Parliament, London, 12 May.
- Goldsworthy, K. (2014) Design for Cyclability [Presentation], Circular Design Challenge. FACT Group (Ellen MacArthur Foundation CE100 Sub Group), Copenhagen, 22 October.
- Goldsworthy, K. (2015) Track and Trace Technologies for Textiles: The importance of material intelligence for circular design [Presentation] Pushing the bounds of materials and information: tracking and tracing in a circular economy. RSA & The Great Recovery, Fablab London, London, 16 February.
- Goldsworthy, K. (2015) Design for Cyclability; approaches towards systemic change for fashion & textiles [Presentation], Towards a Circular Textile Industry – Exploring proactive approaches to realise circular material flows in the Textile Industry. Circle Economy, Resource Event, Excel London, 3 March.
- Politowicz, K. (2013) The Changing Face of Value [Debate panelist], The Cultural Capital Exchange. British Academy. 23 October.
- Ribul, M. (2015) DeNAture [Presentation] Pushing the bounds of materials and information: tracking and tracing in a circular economy. RSA & The Great Recovery, Fablab London, London, 16 February.
- Vuletich, C. (2015) Right/Left Brain: Creating Balance in Design and Life, Tamworth Textile Triennial, Sydney. 16 April 2015.
- Vuletich, C. (2013) TED and the work with MISTRA at Konstfack [Presentation], EFF's (Ethical Fashion Forum): Source Fashion Summit. The Crystal, London. 12 July.
- Vuletich, C. (2014) Design the Future: the Toxic Impacts in the Fashion Industry [Presentation] Flourish Fashion Festival. Sydney, Australia, 2 December.

Academic Keynotes

- Earley, R. (2012) TED's Ten & MISTRA Future Fashion [Presentation], UAL Green Week – Perspectives on Sustainable Design. Central Saint Martins, London, 6 February.
- Earley, R. (2012) MISTRA Future Fashion [Presentation], TFRC Open Lectures. Central Saint Martins, London, 18 June.
- Earley, R. (2012) MISTRA Future Fashion [Presentation], TED's 24. Chelsea College of Arts, London, 19 June.
- Vuletich, C. (2013) Social Textiles: An Investigation of Design for Social Wellbeing in the Lifecycle [Presentation], TFRC Wellbeing event. CSM, London, 8 July.
- Politowicz, K. (2013) Design Lifetimes: A Manifesto for Strategic Change [Professorial Platform lecture]. Chelsea College of Arts, London, 17 July. Also - MISTRA Future Fashion [Presentation], Integrating Sustainable Practice. University of the Arts London, London, 20 September.

Press Articles

- Earley, R. (2013) 'MISTRA Future Fashion'. Interview with Becky Earley. Interviewed by Dagliden, J. & Lundberg, M. for Haute Green – den nya ecochica evolutionen, PLAZA Kvinna magazine, Stockholm, April/May issue.
- Earley, R. (2013) 'MISTRA Future Fashion'. Interview with Becky Earley. Interviewed by Gast, M. for Die Suche nach der Textilien Zukunft, Form Magazine, Germany, issue 247, May/June.

- Earley, R. and Politowicz, K. (2012) 'MISTRA Future Fashion'. Full page interview for Design Intelligence; Fashion, Swedish Institute and Designboost, New York City, 18 – 19 September.
- Earley, R. (2012) 'MISTRA Future Fashion', in CCW Camberwell Chelsea Wimbledon, CCW Graduate School (ed.) Bright 8 – Graduate School Directory 2012/13. London: p. 31 - 32, ISBN 978-1-908339-02-7.
- Earley, R. (2013) Interview with Becky Earley, in CCW Camberwell Chelsea Wimbledon, CCW Graduate School (ed.) Bright 9 – Graduate School Directory 2013/14. London: p. 72 - 73, ISBN 978-1-908339-06-5.
- Earley, R. (2013) 'MISTRA Future Fashion', in CCW Camberwell Chelsea Wimbledon, CCW Graduate School (ed.) Bright 9– Graduate School Directory 2013/14. London: p. 27, ISBN 978-1-908339-06-5.
- Earley, R. ed (2012) 'MISTRA Future Fashion', in University of the Arts London, Textile Futures Research Centre (TFRC) Material Futures 01. London: p.65 – 67, ISBN 978-1-906908-19-5.
- Earley, R. (2013) 'MISTRA Future Fashion'. Interview with Becky Earley. Interviewed by Gast, M. for Die Suche nach der Textilien Zukunft, Form Magazine, Germany, issue 247, May/June.
- Earley, R. (2014) 'MISTRA Future Fashion'. Interview with Becky Earley for Investment required to make upcycling viable, Ecotextile News, May 2014. Available at: <http://www.ecotextile.com/2014040112526/fashion-retail-news/investment-required-to-make-upcycling-viable.html> (Accessed: 31 March 2015).
- Earley, R. (2014) 'Fast ReFashion'. Interview with Becky Earley for UAL research news. Available at: <http://newsevents.arts.ac.uk/44229/beckyearley/> (Accessed: 31 March 2015).
- Earley, R. (2014) 'Becky Earley and Textiles Environment Design'. Interview with Becky Earley for CCW Graduate School (UAL) blog. Available at: <http://www.ccwgraduateschool.org/becky-earley-and-textile-environment-design-ted/> (Accessed: 31 March 2015).
- University of the Arts London (2012) BA Textile Design. London, University of the Arts London [Exhibition catalogue].
- Redress (2013) 'Get informed', The August Issue: Newsletter. Available at: <http://us2.campaign-archive2.com/?u=0208d355ae4e22f1b6d46dc88&id=1df76393ad&e=f70f9b1d89> (Accessed: 31 March 2015).
- MISTRA Forsking (2013) 'Textiletoolbox', Newsletter. Available at: http://www.mistra.org/aktuellt/nyhetsarkiv/2-6-2013-webbplats-ska-fanga-in-ideer-och-lyfta-hallbar-modedesign.html?utm_source=Paloma&utm_medium=Newsletter&utm_campaign=Nyhetsbrev (Accessed: 31 March 2015).
- Time For Heroes (2013) 'TED TextileToolbox', Design Must go Green., Time for Heroes blog. Available at: <http://timeforheroesdesignmustgogreen.blogspot.co.uk/> (Accessed: 31 March 2015).
- Durated (2013) 'Fix It', Time for Heroes blog. Available at: <http://timeforheroesdesignmustgogreen.blogspot.co.uk/2013/05/textile-toolbox.html> (Accessed: 31 March 2015).
- Ethical Fashion Forum (2012) 'Swedish Institute & PARSONS NYC 'Design Intelligence'' Event Review. Available at: <http://source.ethicalfashionforum.com/article/event-review-swedish-institute-parsons-nyc-design-intelligence-read> (Accessed: 31 March 2015).
- Redress (2013) 'EcoChic Design Award 2013 Magazine' Available at: http://issuu.com/redressasia0/docs/brochure_at_27_dec (Accessed: 5 May 2015).
- Redress (2014) The Redress Forum 2014: Designer Challenge with Miele / Challenge. Available at: https://www.youtube.com/watch?v=htqclz_r0-M&feature=player_embedded (Accessed: 31 March 2015).
- Redress (2014) 'Textiletoolbox, January News: Newsletter. Available at: <http://us2.campaign-archive1.com/?u=0208d355ae4e22f1b6d46dc88&id=79c50b804e&e=5b8a65f754> (Accessed: 31 March 2015).
- Chelsea College of Arts (2014) 'Textiletoolbox exhibition to explore sustainable textile design', Chelsea Blog. Available at: <http://blogs.arts.ac.uk/chelsea/2014/11/05/textile-toolbox-exhibition-explore-sustainable-textile-design/> (Accessed: 31 March 2015).
- Ribul, M. (2014) 'Textile Toolbox – MISTRA Future Fashion', ICHI, issue 1, November 2014. Available at: <http://ichimag.com/article/textile-toolbox-mistra-future-fashion/> (Accessed: 31 March 2015).

- Harvey, B. (2014) 'A Jumper to Mend, A Jumper to Lend'. Interview with Bridget Harvey for UAL research news. Available at: <http://newsevents.arts.ac.uk/44126/textile-toolbox1/> (Accessed: 31 March 2015).
- Ribul, M. (2014) 'DeNAture'. Interview with Miriam Ribul for UAL research news. Available at: <http://newsevents.arts.ac.uk/44247/textiletoolbox3/> (Accessed: 31 March 2015).
- Landalv, J. (2014) 'Sweaver'. Interview with Josefin Landalv for UAL research news. Available at: <http://newsevents.arts.ac.uk/44272/textiles-toolbox4/> (Accessed: 31 March 2015).
- Nordic Fashion Association (2015) 'TED visits Denmark, get first hand knowledge on how to use TEDs TEN and learn about sustainable design strategies.' Nordic Fashion Association News. Available at: <http://www.nordicfashionassociation.com/news/ted-visits-denmark-get-first-hand-knowledge-how-use-teds-ten-and-learn-about-sustainable-design> (Accessed: 20 May 2015).

Educational Lectures

- Earley, R. and Politowicz, K. (2012) TED Interconnected Design Thinking [Introduction to Elective program] MA students. Konstfack University of the Arts, Crafts and Design, Stockholm, 2 October.
- Earley, R. (2013) Material Futures [Lecture] SKIP (Skills Development for Researchers in Design Practice). University of the Arts London, London, 6 March.
- Earley, R. (2014) MISTRA Future Fashion [Introduction to BA Textile Design and MA Textile Design]. Chelsea College of Arts, London, 17 October.
- Goldsworthy (2013) MISTRA Future Fashion [Lecture] MA and BA Textile Design. Chelsea College of Art & Design, London, 4 and 25 February.
- Goldsworthy, K. (2013) The TEN: a framework for action [Lecture]. Konstfack University of the Arts, Crafts and Design, Stockholm, 26 February.
- Goldsworthy, K. (2013) An Introduction to TED's The TEN [Introduction to BA and MA students]. Chelsea College of Art & Design, London, 11 October.
- Goldsworthy, K. (2013) Material Journeys: elective outline [Introduction to MA students]. Konstfack University of the Arts, Crafts and Design, Stockholm, 15 October.
- Politowicz, K. (2011) TED's TEN strategies for sustainable design [Lecture], MA Textile Design. Chelsea College of Art & Design, London, 14 October.
- Politowicz, K. and Goldsworthy, K. (2014) Practice, Prototypes and Collaboration: towards systemic change in the textile industry [Lecture]. Parsons the New School for Design, New York, 29 January.
- Ribul, M. (2014) MISTRA Future Fashion [Lecture] Sustainable Design. Territories of Practice (ToP) for BA Textile Design students. Chelsea College of Arts, London, 17 October.
- Vuletich, C. (2014) Social Textiles: The Role of Design in Ethical Production [Presentation to BA and MA students]. Visiting PhD Fellow at University of Technology (UTS) Australia. 17 March.
- Vuletich, C. (2012) Design for Change: A Case Study for Design-led Upcycling [Lecture]. Hong Kong Design Institute, Hong Kong, 25 September.

key performance indicators

In terms of performing against targets, the team and the project met and often exceeded levels set. The project's academic outputs in particular were much higher than anticipated. Feedback from workshop participants was very strong wherever the team delivered.

The online exhibition becoming a real, international, touring exhibition gave the project a new global audience a chance to see and interact with the ideas. The online survey that accompanied the exhibition – designed so that people were directed to the survey as they landed for the first time on the site – provided indicators from diverse perspectives.

There were changes to targets as ways of working shifted in response to the needs of the stakeholders and publishing opportunities arose. Using interviews did not become as central to the process as we anticipated – apart from with the PhD researcher. Using online surveys were felt to be valuable – more easily spanning the distance between researchers and stakeholders. Likewise, the use of film online became more important as the project progressed.

Web Platform

popular writing, research landscaping texts & films;
Textiletoolbox website content:

	TARGET	ACHIEVED
Website hits	2013: 13,000 website hits 2014: 20,000 website hits 2015: 10,000 website hits (counted using Google analytics) Total target: 43,000	From the web platform launch until project end on 31 May 2015 we have had 75,028 page views (hits) and 31,449 sessions (visits)
Blog posts internal team	40 new blog texts generated by internal team	54 blog posts generated by external team on the TED website to document and disseminate the research
Blog posts external team	30 of new blog texts	31 blog posts generated and published on the Textile Toolbox platform website
Films and animations	6 films and animations	6 films and animations: 1 animation, 5 researcher interviews and 5 exhibit films
Essays internal team	3 new essays generated by internal team	0 essays from internal project team. Chapters will be written for the Textile Toolbox book.
Essays external team	10 new essays generated by external team	9 essays generated by external team. Essays to be included in Textile Toolbox book.
Interviews	15 interviews conducted by project team	Becky, 1, at H&M with Johan and Ulrika. Clara, 6, with designers and other stakeholders.

Table 21: Web platform

Workshops

training and redesign experience workshops for a selection of the stakeholder group:

	TARGET	ACHIEVED
Corporation Design Team	1 pilot course for Large Companies and Corporations; 30 participants in total	1 pilot course for Large Companies and Corporations; 350 staff members reached through the lecture series and 30 participants reached through the workshop series
SME Designers	3 modules for SME's and Sole Traders; 70 participants in total	4 modules for SME's and Sole Traders; 160 designers reached in total through workshops with SME's, of which 104 designers reached at SFA
Emerging Designers	3 elective modules designed and delivered; 50 student participants in total	3 elective modules designed and delivered and 6 international emerging designer workshops; 155 emerging designers reached through
Academic Researchers	10 workshops with internal project team (with 15 participants); 5 workshops with external project team and consortium members (with 40 participants)	12 internal workshops with project team; 5 workshops with project team and consortium partners

Table 22: Workshops

Web Exhibition

new design research briefs, prototype designs, exhibition visitors and global audience:

	TARGET	ACHIEVED
Garment concepts	50 new garment concepts generated on paper through project workshop	60 new garment concepts generated through workshops
New concepts and films	8 new concepts generated as prototypes; 5 films and animations:	10 new concepts generated and 6 exhibition films
Visitors	25,000 online visitors; 500 sign ups; 200 downloads	17,927 visitors; 179 sign ups; 50 downloads
Open exhibition submissions	10 open exhibition submissions	5 open exhibition submissions
Press	10 mentions in newspapers, periodicals and trade publications	10 mentions in online articles, 26 mentions in online and printed press articles
Social media	500 members/followers to social media sites – Facebook and Twitter	623 Twitter followers, 1004 Facebook group members

Table 23: Web exhibition

Academic Publishing

journal Articles & conference presentations:

	TARGET	ACHIEVED
Peer reviewed papers and journal articles published by internal team members	2 peer reviewed journal papers published by internal team members, as single or co-authors	6 published peer reviewed journal papers published by internal team members
Peer reviewed paper published by external team members	1 peer reviewed paper published by external team members (associate researchers – see list), 2 published peer reviewed papers by external team members	
Peer reviewed conference presentations	5 peer reviewed/selected conference presentations	11 conference presentations
Peer reviewed conference publications	2 peer reviewed conference publications	4 conference publications
Peer reviewed conference workshops and/or posters	2 peer reviewed conference workshops and/or posters	3 conference workshops and posters

Table 24: Academic publishing

project credits and report review process

Project Team

Researcher	Institution	Principal role in Project 3
Professor Rebecca Earley	UAL	Project Leader
Professor Kay Politowicz	UAL	Researcher
Dr Kate Goldsworthy	UAL	Researcher
Clara Vuletich	UAL	PhD researcher
Miriam Ribul	UAL	Research Assistant
Josefin Landälvs	UAL	Junior Researcher

Project Partners

Partners	Affiliation	Competence
Johan Ward	H&M	Commissioning of Pilot Training Scheme and Lecture Programme
Mike Schragger	SFA	Partner on the SFA workshops; consultant to the H&M pilot training programme

Textile Toolbox Contributors, TED

Name	Role	Contribution
Melanie Bowles	Senior Lecturer of Digital Textiles, Chelsea College of Arts	Design item, exhibition, 'Smorgas Board'
Kathy Round	Senior Lecturer in Printed Textiles, Chelsea College of Arts	Design item, exhibition, 'Smorgas Board'
Isabel Dodd	Senior Lecturer of Stitch, Chelsea College of Arts	Design item, exhibition, 'Shanghai Shirt'
Bridget Harvey	UAL PhD researcher	Design item, exhibition, 'Redressing Activism' and 'A Jumper...'
Emmeline Child	UAL PhD researcher	Design item, exhibition, 'ReDressing Activism'
Matilda Aspinall	UAL PhD researcher	Blog posts, Textile Toolbox

Textile Toolbox Contributors, Associate Researchers

Contributor	Affiliation	Competence / Contribution
Phil Hadridge	iDenk	Contribution to: design, delivery and evaluation of project workshops; building TED team competence in facilitation/webinar skills; paper writing

Dr. Jen Ballie	Post Doctoral Research Associate, Design in Action, Dundee, Scotland	Post Doctoral Research Associate, Design in Action
Sass Brown, Assistant Professor	School of Art & Design at the Fashion Institute of Technology, New York	Acting Associate Dean, author of 'Eco Fashion' and 'Refashioned' (Lawrence King: London)
Prof. Jonathan Chapman	Professor in Sustainable Design & Course Leader of the MA Sustainable Design University of Brighton, UK	Emotionally durable design/ Blog post contributor
Dr. Hanna de La Motte	Chalmers University of Technology & SP Technical Research Institute of Sweden	PhD in Organic Chemistry/ DeNAture collaborator
Dr. Hjalmar Granberg	Senior Research Associate, Innventia AB, Stockholm, Sweden	Seamsdress collaborator
Dr. Alison Gwilt	Sheffield Hallam University, UK	Fashion Designer & Sustainable Fashion & Textiles Researcher / Blog post contributor
Kristine Harper	KEA Copenhagen School of Design and Technology, Denmark	Lecturer on Sustainable Aesthetics / Blog post contributor
Sandy McLennan	Managing Director at East Central Studios, London, UK	Specialist in fibre and textile development for fashion/ Blog post contributor
Emma Rigby	PhD Researcher, London College of Fashion, University of the Arts London, UK	PhD Researcher at London College of Fashion, University of the Arts London, UK
Dr. Timo Rissanen	Assistant Professor of Fashion Design and Sustainability Parsons The New School for Design, New York	Zero Waste Design/ Blog post contributor / Workshop event
Karen Spurgin	Co-founder, AO Textiles, London.	Textile designer: Embroidery; natural dyeing. Shanghai Shirt II collaborator
David Telfer	David Telfer	Designer, London, UK
Dr. Otto von Busch	Assistant Professor of Integrative Fashion. Parsons the New School for Design, New York and Konstfack University College of Art, Craft and Design in Stockholm, Sweden	Design Activism, Hacktivism. Blog post contributor

Barry Waddilove	Ellen McArthur Foundation. Schmidt-MacArthur Fellow, founder of Home Product Design	Design tools, blog post contributor
Anja Connor-Crab	PhD Researcher, University of Brighton, UK	Design tools, blog post contributor

Project Support Team

Name	Affiliation	Role
Angela Hartley	TFRC, UAL	Project management support
Ania Stawarska	TFRC, UAL	Economic reporting support
Joseph Kohlmaier	Polimekenos	Graphic Design / Website / Publication
Allyson Waller	A.W Projects	Graphic design, tools
Louise O'Brien	TFRC, UAL	Graphic design intern
Ana Diaz	SokFok Studio	Audio visual support
Emma Cowlam	Emma Cowlam	Illustrations
Phillip Koll	Phillip Koll	Fashion photography
José Farinha	José Farinha	Photographer
Mischa Haller	Mischaphoto	Photographer
Lou'Ana Carron	Lou'Ana Carron	Fashion photography styling
Sian Weston	Goldsmiths, University of London	Education research support
Lauren Currie	Snook	Service design, team support
Beth Glennie, Lily Kamper, Naomi Whitehead, Lauren Cardoe	TED, UAL	Interns

Institutional Support

Industrial partners	Affiliation	Role
Professor <u>Oriana Baddeley</u>	UAL	<u>Dean of Research</u>
Professor <u>Malcolm Quinn</u>	UAL	Associate Dean of Research and Director of Graduate School, CCW
Anne Smith	UAL	Research Centre Line Manager, Dean of Design, Central Saint Martins
Simon Willmoth	UAL	Head of Research Management Administration (RMA)
Lorna Bircham	UAL	Course Director for MA Textile Design, CCW

Caryn Simonson	UAL	BA Textile Design Course Director, Chelsea College of Arts
Professor Helena Soderberg	Konstfack University College of Arts Crafts & Design, Stockholm, Sweden	Head of Department
Professor Bella Rune	Konstfack University College of Arts Crafts & Design, Stockholm, Sweden	Textiles (Department of Crafts)
Cecilia Heffer	University of Technology Sydney, UTS	Senior Lecturer Textiles, School of Fashion and Textiles

Review Process

We planned different touch points for the project from a range of experts. Project 3 has many stakeholder groups – staff at Konstfack, H&M, and SFA in Stockholm; staff at Chelsea, Central Saint Martins and TFRC; Clara’s PhD network and supervisors/advisors, etc. As geographic location of all the stakeholders prevented us from holding regular meetings with the same group of advisors, we opted to design several key points of contact between the project team and the experts who agreed to give us feedback and guidance, alongside interactions with stakeholders.

TED’s 24 Event, London July 2012

Review of project work to date by a group of multidisciplinary science design and industry researchers.

Member	Affiliation	Competence
Burak Cakmak	Dean, Parsons the New School	Sustainability expert, ex Gucci Group, and consultant to UN
Sarah	Copenhagen Business School	Research Assistant, project 7
Gustav Sandin & Anna Palme	Chalmers Chemical and Biological Engineering	PhD students, project 2
Michelle Lowe Holder	Michelle Lowe Holder (SME)	designer, her collections focus on zero waste and up-cycling
Kirsti Reitan Andersen	Copenhagen Business School	PhD student, project 1
Marijane Jonsson & Ingrid Stigzelius	Stockholm School of Economics	PhD students
Nick Ryan	Production Advisor and Director at Worn Again	Circular economy expert
Liz Parker	Freelance researcher and a member of the Ethical Fashion Forum	Ethical production
Dr Linda Sandino	CCW / V&A Senior Research Fellow	Design history

Monica Hundal	Business manager, Enterprise and Innovation Department at CSM , UAL	Research and innovation for industry
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TED's Campfires Event, London, 18 July 2013

Review of project work to date by three design research and enterprise experts.

Member	Affiliation	Competence
Professor Marie O'Mahony	Ontario College of Art and Design (OCAD) University, Toronto, Canada	Professor of Advanced Textiles for Fashion Design: Technical textiles; well being; sportswear
Professor Mathilda Tham	Goldsmiths, University of London, Linneaus University, Kalmar & Vaxsjo, Sweden	Professor in design, design activist, metadesign researcher
Allanah Cullen	Camberwell, Chelsea and Wimbledon Colleges of Arts	Head of enterprise, fashion and textile business and marketing

Project 3 Review, Stockholm, 4 December 2013

Review of project work to date by three Swedish design experts.

Member	Affiliation	Competence
Professor Simonetta Carbonaro	Realise Consultants / Boras, Sweden	Textile and Fashion Researcher, Adjunct Professor, Swedish School of Textiles
Richard Prime	Svensk Form / Cool Hunting, Sweden	Editor for Swedish Design press and media
Bradley Quinn	Author / Curator, Sweden	Future fashion within a technology sector

Project 3 Review Workshop, London, 28 March 2014

Review of online exhibition plans by four world-leading Zero Waste design researchers.

Member	Affiliation	Competence
Lynn Wilson	Zero Waste Scotland, Stirling, Scotland	Zero Waste, industry and government projects
Holly McQuillan	College of Creative Arts, Massey, University of New Zealand, Wellington	Zero Waste Design

Mentoring and Feedback

1:1 feedback sessions, commissioned from subject specialists.

Member	Affiliation	Competence
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Phil Hadridge	Idenk, Cambridge, UK	Management coach and facilitator. 1:1 advisory sessions with project leader, and group sessions with the tea, co-authored a conference paper for the project.
Dr Elaine Igoe	Senior Lecturer in Fashion and Textile Design at the University of Portsmouth, UK	In Textasis: Matrixial Narratives of Textile Design. 1:1 advisory sessions with PhD researcher

Curator's Exhibition Tours, London and Copenhagen, 2014-2015

Curators tours given by Professor Becky Earley and Dr Kate Goldsworthy to external visitors that represented a range of stakeholders for the research: a design SME, academic research at UAL and a scientist/entrepreneur; faculty staff at KEA in Copenhagen; and industry participants at events in Glasgow, ExCel London and Boras, Sweden.

Member	Affiliation	Competence
Ella Doran	Ella Doran design	Sustainable textiles, SMEs
Dr. Suran Goonatilake	CEO and founder of Bodymetrics	Technology for fashion, links to science research at UCL / Imperial College London
Roz Hibbert	Line Consultants	Materials expert
Professor Malcolm Quinn	Associate Dean of Research and Director of Graduate School	Academic Research, Professor in Cultural and Political History, CCW Graduate School, UAL

Report Review Process, 2015 - 2016

Reviewer	Affiliation	Competence
Professor Adam Thorpe	UAL, Central Saint Martins	Socially Responsive Design, Co-Director of the Design Against Crime Research Centre (DACRC) and founder of UAL's DESIS (Design for Social Innovation and Sustainability) Lab.
Dr Rosie Hornbuckle	UAL	Researcher and educator focusing on Design, Materials and Sustainability overlaps. PhD - "Design and The Materials Cycle: An investigation into secondary material use in design practice", involving working with reprocessors, manufacturers and designers to understand the barriers to utilizing waste materials in high-end volume production.
Professor Marie O'Mahony	Professor at Ontario College of Art and Design University (OCAD U), Toronto	Consultant, professor, author and curator specialising in advanced textiles for fashion design. She has also served on the Australian Government's Textile, Clothing and Footwear Innovation Council (TCFIIC) from 2009-2011.
Allanna McAspurn	MADE BY, CEO	Expert in sustainability benchmarking, strategy and implementation in the fashion and textile industry. During the past 15 years she has worked at every stage of the fashion supply chain from environmental design and product development with

		the world's leading luxury brands, through to product end of life concepts with major UK High Street retailers.
Orsola de Castro	Fashion Revolution Co-Founder	Award-winning Designer, From Somewhere label (established 1997), collaborations include Robe Di Kappa, Jigsaw, Speedo and Tesco. Founder of Esthetica at London Fashion Week, British Fashion Council, to showcase labels designing sustainably.
Jenny Theolin	Hyper Island / Studio Theolin	Creative director, curator and producer specialising in the visual arts, music and culture.



About Mistra Future Fashion

The purpose of the Mistra Future Fashion Program is to deliver knowledge and solutions that the Swedish fashion industry and its stakeholders can use to improve the fashion sector's environmental performance and strengthen its global competitiveness. The program is structured so that it leverages the expertise and networks of leading Swedish and international research institutes and universities. Stakeholders engaged in the program include governmental agencies, voluntary organisations, and companies within the entire textile value chain: forestry, pulping, textile manufacturing and recycling. To find out more please visit www.mistrafuturefashion.com.