The Nordic Textile Journal


Special Edition: Sustainability & Innovation in the Fashion Field

1/2012
The Nordic Textile Journal is a peer reviewed international journal publishing high-quality articles dedicated to research and artistic development related to textiles and fashion.

The Journal considers only manuscripts that have not been published elsewhere. The Journal is published in English by the CTF Centre of Textile Research in Borås, Sweden. Copyright is by the publisher and the authors.

The Journal is issued in printed form, normally one issue annually. Articles from earlier issues will also be available in electronic form via BADA, the Borås Academic Digital Archive http://bada.hb.se/handle/2320/1556

Manuscripts in the following categories will be considered for publication:

1. Research articles: A research article is a regular article which aims to present new findings in textile and fashion research.

2. Articles on artistic development: An article on artistic development aims to present artistic progress and may relate to practice-based design research, design methodology or novel achievements in textile art and craft.

3. Notes: A note is a short article, which aims to report new findings.

4. Review articles: A review article aims to present already existing findings and may be a book review or an exhibition review.

5. Conference articles: Upon agreement with conference organizers, selected conference contributions may be published by the Journal in a special section.

Areas covered by the Nordic Textile Journal include several aspects related to textiles and fashion, such as design and arts, engineering and technology, business, management and socio-economic issues, as well as cross-disciplinary and transdisciplinary issues.
EDITOR

Fashion Function Future (F:3) - a research programme
Lisbeth Svengren Holm

RESEARCH ARTICLES

Crafting Smart Textiles – a meaningful way towards societal sustainability in the fashion field?
Kirsti Kuusk, Oscar Tomico, Geert Langereis, Stephan Wensveen

The Worn, The Torn, The Wearable: textile recycling in Union Square
David Goldsmith

Multifarious Approaches to Attain Sustainable Fashion
Nidhi L. Sharda, Mohan Kumar VK

Rethinking Available Production Technologies – the case of a thermally insulting footwear concept
Nils-Krister Persson, Anna-Carin Jonsson

Ideas For Another Workwear
Daniel Larsson

Proactive Fashion Design for Sustainable Consumption
Kirsi Niinimäki

HeadCrowd: visual feedback for design
Britta Kalkreuter, David Robb

Value Innovation and Demand Chain Management – keys to future success in the fashion industry
Dag Ericsson, Malin Sundström

TEXTILE NOTES

Ambience’11

Interactivity

From the Brundtland Report to the Global Organic Textile Standard

EDITORIAL BOARD

The Editorial Board for the Nordic Textile Journal

CONTRIBUTORS

Notes for authors
We are all affected by fashion: as individuals when we use clothes and other products to create an identity and an image and as consumers participating in the wheel of consumption and economy. As researchers, we try to understand fashion and its actors and how research can contribute to a better society and prosperous industries. This issue of the Nordic Textile Journal presents both articles based on research conducted at the University of Borås and articles from other researchers who share our interest in sustainable fashion and the textile industry.

Once upon a time, Borås was well-known as a cluster for the Swedish textile industry. Although many textile and fashion businesses closed down as a result of the decline of the industry in the 1970’s, the Borås region still hosts many fashion and textile businesses and is the home of the only fashion incubator in Sweden (Modeinkubatorn). Together with the Swedish School of Textiles, the University of Borås and other educational organisations focusing on fashion and textiles this region has once again become a hub for a dynamic fashion and textile sector. Thus, it is no coincidence that a research programme called Fashion Function Future (F:3) was initiated at the University of Borås in 2010.

Fashion Function Future (F:3) – is a programme for research and artistic development, addressing issues and topics ranging from artistic design to distribution logistics, as well as the marketing and management of fashion and textile companies, where sustainability is a shared concern. The programme is based on an interdisciplinary environment that supports the development and balancing of artistic expressions, design methodology, technology and management, all related to the field of fashion and textiles. Several departments at the University of Borås collaborate to achieve this interdisciplinary approach and contribute with the knowledge required to shape F:3.

Although we are based in Borås, where tradition associates fashion with clothing and textiles, we realise the term fashion is more complicated than that and that it needs to be further investigated for our readers to fully understand the intention behind our programme. Our research is Future oriented, but the in-between term Function also needs some explanation, which we will come back to below.

To explain why fashion is not only the study of dress and clothing, Kawamura (2005, p. 1) coined the term “Fashion-ology”, which she defines as “a sociological investigation of fashion, and it treats fashion as a system of institutions, that produces the concept as well as the phenomenon/practices of fashion”. Fashion is an immaterial concept and clothes are the materialized objects of this concept. In this sense, Kawamura refers to the actors who are part of a specific system that defines what is defined as fashion and what is not. For clothing to become fashion, it is not enough that a collection

Fashion Function Future (F:3) – a research programme
Lisbeth Svengren Holm
Professor and Head of F:3

We are all affected by fashion: as individuals when we use clothes and other products to create an identity and an image and as consumers participating in the wheel of consumption and economy. As researchers, we try to understand fashion and its actors and how research can contribute to a better society and prosperous industries. This issue of the Nordic Textile Journal presents both articles based on research conducted at the University of Borås and articles from other researchers who share our interest in sustainable fashion and the textile industry.

Once upon a time, Borås was well-known as a cluster for the Swedish textile industry. Although many textile and fashion businesses closed down as a result of the decline of the industry in the 1970’s, the Borås region still hosts many fashion and textile businesses and is the home of the only fashion incubator in Sweden (Modeinkubatorn). Together with the Swedish School of Textiles, the University of Borås and other educational organisations focusing on fashion and textiles this region has once again become a hub for a dynamic fashion and the textile sector. Thus, it is no coincidence that a research programme called Fashion Function Future (F:3) was initiated at the University of Borås in 2010.

Fashion Function Future (F:3) – is a programme for research and artistic development, addressing issues and topics ranging from artistic design to distribution logistics, as well as the marketing and management of fashion and textile companies, where sustainability is a shared concern. The programme is based on an interdisciplinary environment that supports the development and balancing of artistic expressions, design methodology, technology and management, all related to the field of fashion and textiles. Several departments at the University of Borås collaborate to achieve this interdisciplinary approach and contribute with the knowledge required to shape F:3.

Although we are based in Borås, where tradition associates fashion with clothing and textiles, we realise the term fashion is more complicated than that and that it needs to be further investigated for our readers to fully understand the intention behind our programme. Our research is Future oriented, but the in-between term Function also needs some explanation, which we will come back to below.

To explain why fashion is not only the study of dress and clothing, Kawamura (2005, p. 1) coined the term “Fashion-ology”, which she defines as “a sociological investigation of fashion, and it treats fashion as a system of institutions, that produces the concept as well as the phenomenon/practices of fashion”. Fashion is an immaterial concept and clothes are the materialized objects of this concept. In this sense, Kawamura refers to the actors who are part of a specific system that defines what is defined as fashion and what is not. For clothing to become fashion, it is not enough that a collection
of clothes has been shown on the catwalk. The participation of multiple actors is required for something to be defined as fashion. Hence, fashion is a sociological phenomenon, a socially constructed process, because a social context is required. It is also one reason why research in fashion primarily takes place within the field of sociology and considers fashion a cultural phenomenon.

Although the fashion industry is an old industry, research focusing on fashion businesses from a management perspective is only a relatively young field. In the 1980s, an interest emerged in the marketing of fashion. (cf. Rogers and Garman, 1983; Hines & Bruce, 2001). This happened in the form of new types of companies such as H&M and Zara conquered fashion markets globally. This triggered Teri Agnis to write her book The End of Fashion: the Mass-Marketing of Clothing in 1999. However, fashion marketing continued to grow as a subject; especially, luxury brands raised an interest among brand researchers in the late 1990s and have continued to grow ever since (cf. Birtwistle, 1997; Okonkwo, 2004; Okonkwo, 2009; Radon, 2010). Business schools such as Bocconi in Milan, Essec outside Paris and the London Business School even initiated special Master’s programmes addressing aspects of luxury branding.

In 2009, the Swedish School of Textiles started a new Master’s programme in Fashion Management and Marketing in collaboration with the London College of Fashion, where the Master’s programme in Fashion Management at the LCFC was a source of inspiration. This opportunity to enter in fashion with a programme from a management and marketing perspective and also a need to enhance the research profile in textile and fashion already established across several departments at the University of Borås. This collaboration came to form the foundation for the research programme Fashion Function Future.

Fashion is, as stated by Kawamura (2005), a system driven by multiple actors that are part of the fashion system, but also because they are worn primarily for socio-cultural reasons. All clothes are not fashion: not only because they are not part of the fashion system, but also because they are worn primarily for their function. This is not to say that aesthetics is not relevant for functional products, such as sportswear designed for the wearers and users both as identity markers and because of their performance. The concept of fashion is rather related to uniform, traditional folk costumes and other textile products. This applies to everything from workwear and sportswear to uniforms, traditional folk costumes and other textile products. But what is considered function and what is considered fashion changes over time. Fashion is not just about the clothes and the wearers but also about the context in which they are worn. Although we cannot present all topics, we have initiated three areas were considered: environment, ethics, and economy. There are problems along the entire chain of production of garments and other products essential to the world of fashion, from issues related to the cultivation of fibres, pollution of soil and water, and exploitation of animals, but also to issues related to consumption of fashion and clothing. The task of solving all these problems is overwhelming. Hence, the fashion industry is a complex industry, as well as for the consumers, holds many great challenges.

In the creation of the new research programme in 2010, the challenges and opportunities facing the fashion industry guided our ideas for different projects. When defining sustainability, fashion is a global industry to a great extent and one where the products in fashion are produced in other European countries and the Far East. Digital development is changing the ways in which companies reach their consumers and this is an opportunity for small companies, although it is not quite as easy as it is sometimes seen. We have tried to shed some light on the existence of the Swedish Fashion Miracle” based on the success of several Swedish luxury brands (Falk, 2011). Rather than being a matter of signal fashion instead, the fashion industry is willing to become an international company is a great challenge to a small enterprise. Thus, economic sustainability is a subheading in our definition of sustainability and also the topic of some of the research projects. In this sense, sustainability is at the very heart of consumer society, and provides great opportunities for newly industrialized countries, while it also challenges our capability to solve many of the environmental issues related to it that cause severe problems. Fashion is responsible for some of the obstacles to achieving a sustainable society and environment, but it also needs the whole chain of production of garments and other products essential to the world of fashion, from issues related to the cultivation of fibres, pollution of soil and water, and exploitation of the work force and to the consumers, holds many great challenges.

Although we cannot present all topics, we have initiated research projects addressing development of fibres that are harmless to the environment, aesthetics of new materials, organisation of local production, new business models based on resource sharing, and sustainable supply chains without returns, the international growth of Swedish fashion design companies, leadership in fashion design companies and for fashion etalors, innovation in the field of fashion, as well as studies of consumer behaviour from a sustainability perspective. In the textile and fashion value chain, from ideas to customers and beyond, the decisive stage is in the design process, which combines artistic skills and functional considerations in order to make fashion products logicalising the entire, attracting to customers, and resourceful from an environmental and sustainability point of view. For more information about on-going projects, please visit our homepage: http://www.tfl.se.

References


Crafting Smart Textiles – a meaningful way towards societal sustainability in the fashion field?

Kirsti Kuusk, Oscar Tomico, Geert Langereis
Department of Industrial Design, Eindhoven University of Technology
k.kuusk@tue.nl, o.tomico@tue.nl, g.r.langereis@tue.nl

Stephan Wensveen
Mads Clausen Institute, University of Southern Denmark
s.a.g.wensveen@mci.sdu.dk

Abstract
Smart textiles with its vast range of possibilities provide a considerable opportunity for societal sustainability for the waste-oriented fashion industry. May the new textiles react to the environment, wearer, have a mind of its own or simply provoke and inspire people – it is a great tool for the transition from the product-oriented industry to the service-minded economy. Fashion field needs to mature and adapt to the new rules set by the user within today’s environment. While developing the new field of smart textiles, this paper stresses the importance of learning from traditional crafts and the value of craftsmanship.

We start by introducing the importance of crafting and connecting it to the industrialized way of producing. Then, we ask whether we could merge valuable insights from both in order to develop the smart textiles area. Later, you will find an example project merging Quick Response (QR) codes with traditional embroidery that inspired a set of TechCrafts explorations in a form of student projects. In case of the embroidered QR codes, the link to technology is an add-on feature to textiles. In the other examples, craftsmanship technologies are used to create the textile substrate itself. These explorations are the input for a discussion about the role of craftsmanship and skills in developing materials with interactive properties that is held with relation to the possibilities for societal sustainability.

Keywords: craft, crafting smart textiles, digital technology, societal sustainability, culture of connectedness

Introduction
Textiles and traditions, and rituals and crafts related to them have existed for millennia. Natural fibers spun, weaved or knitted together have been close to the human body, environment and conscious for basic survival purposes, social distinctions, expressing different power relations and even interacting with the spiritual realms.
Crafts and everything related to them are much more than some old techniques. Sennett (2008, p. 149) describes craftsman as “a spontaneously created, but change resistant, atrophied and now receding into the past, they had helped people to live in conditions. “It did not matter that under other conditions, for life had become a hindrance rather than help in the new culture is not to satisfy existing needs but to create new ones - to become something new.” (Sennett, 2008, p. 109) Technology developments have given us new ways of looking at things and tools to play with. We like to be connected and belong, similarly to what used to be, in a new non-geographical way. There seems to be a nice synergy between craftsmanship with its drive for detail and quality and values applied through tradi- tions (not) taken while pursuing the efficiency in production and development lines that has shaped our “the way it’s being done” could be questioned or changed. Fashion designers are inventing and proposing new ways for sustainability, but since a new non-geographical way. Also combining craft techniques and the hands-on approach of making things used to bring people into woven all the material needed for her future husband’s clothing. The care for each detail in handicraft was seen as one’s ability to craft the life in general.

Crafts and everything related to them are much more than some old techniques. Sennett (2008, p. 149) describes craftsman as “a spontaneously created, but change resistant, atrophied and now receding into the past, they had helped people to live in conditions. “It did not matter that under other conditions, for life had become a hindrance rather than help in the new culture is not to satisfy existing needs but to create new ones - to become something new.” (Sennett, 2008, p. 109) Technology developments have given us new ways of looking at things and tools to play with. We like to be connected and belong, similarly to what used to be, in a new non-geographical way. There seems to be a nice synergy between craftsmanship with its drive for detail and quality and values applied through tradi- tions (not) taken while pursuing the efficiency in production and development lines that has shaped our “the way it’s being done” could be questioned or changed. Fashion designers are inventing and proposing new ways for sustainability, but since a new non-geographical way. Also combining craft techniques and the hands-on approach of making things used to bring people into woven all the material needed for her future husband’s clothing. The care for each detail in handicraft was seen as one’s ability to craft the life in general.

Crafts and everything related to them are much more than some old techniques. Sennett (2008, p. 149) describes craftsman as “a spontaneously created, but change resistant, atrophied and now receding into the past, they had helped people to live in conditions. “It did not matter that under other conditions, for life had become a hindrance rather than help in the new culture is not to satisfy existing needs but to create new ones - to become something new.” (Sennett, 2008, p. 109) Technology developments have given us new ways of looking at things and tools to play with. We like to be connected and belong, similarly to what used to be, in a new non-geographical way. There seems to be a nice synergy between craftsmanship with its drive for detail and quality and values applied through tradi- tions (not) taken while pursuing the efficiency in production and development lines that has shaped our “the way it’s being done” could be questioned or changed. Fashion designers are inventing and proposing new ways for sustainability, but since a new non-geographical way. Also combining craft techniques and the hands-on approach of making things used to bring people into woven all the material needed for her future husband’s clothing. The care for each detail in handicraft was seen as one’s ability to craft the life in general.
cycles or changing the way people take care of the garments. Textiles that require no washing and garments designed to accept stains, spills and wrinkles as well as low ironing heat play its role here.

An alternative way towards sustainable business-models are repair services that not only save money, but also reduce the amount of income besides from selling more material and garments. Designing and working with local materials and artisans for local culture helps to increase material knowledge of the product means improving from inside. Biomimicry - another exciting emerging field - “...is not simply a tool for copying. Rather it is under- standing and applying principles for success simple at their core - that is more the point.” (Fletcher and Grose, 2012, p. 115). That means changes starting from material level up to processes and proposals for seeing completely different, in harmony with nature, business models.

Slow is not a simple description of speed. Rather it represents a different worldview that names a coherent set of fashion activity to promote the pleasure of variety, the multiplicity and the cultural significance of fashion within biophysical limits. Slow fashion requires a changed idea of what to wear throughout our lives goods” (Fletcher and Grose, 2012, p. 128). Slow fashion means accepting diversity, producing in small scale, and trusting the partners, valuing making and maintaining and a true price of the product incorporating ecological and social costs.

Within smart textiles and garments development, the main issue today is to yet explore possibilities, push borders of what is possible and promote values of potential use. It is very much material, technology driven - more as a hack to prove that something can work, rather than fulfilling a need and growing upon that. Crafting smart textiles is a slow process, hands-on experience, it allows craftsmen to grow together with their creation and the smart textiles to record a narrative, story – tradition.

Because we envision meaningful results from the tension between craftsmanship/connectedness (lower-left) and technology (lower-right). We may expect inspiring design. In figure 1, we can see the existing axes from culture (upper-left) to technology (upper-right). Our approach is to explore the design options of where these two come together. Because we envision meaningful results from the tension between crafts/culture and modern technology, our approach is to place within the final concept.

The beauty of the approach lies not only in the integration of traditional local colors and patterns with new technologies but also in the values, which have been taught through family-line for centuries. Maybe the bed sheets could tell a predefined story or be configured by users. For example, sheets with Danish colors would tell a bedtime story that, while scanned, start telling a fairy-tale that originates from other kind of inputs.

Furthermore, to ask the question, how could traditional craft support or guide technology as a new craft, Kristi experimented QR-coded Traditions concept can be seen as a physical representation of a virtual value. May it be connected to a local wisdom, inspiring quote, personal message from a friend, fairy-tale, history of the product, or to a certain database of information.

QR-coded Traditions
Looking into such developments Kristi Kuuki wanted to incorporate some of the forgotten old wisdom into the new possibilities of digital and otherwise new technologies. While approaching the integration of textiles and technology she aimed to show that, through also, see how new ways of communicating can be achieved. Each step means improving from inside. Biomimicry - another exciting emerging field - “...is not simply a tool for copying. Rather it is understanding and applying principles for success simple at their core - that is more the point.” (Fletcher and Grose, 2012, p. 115). That means changes starting from material level up to processes and proposals for seeing completely different, in harmony with nature, business models.

Slow is not a simple description of speed. Rather it represents a different worldview that names a coherent set of fashion activity to promote the pleasure of variety, the multiplicity and the cultural significance of fashion within biophysical limits. Slow fashion requires a changed idea of what to wear throughout our lives goods” (Fletcher and Grose, 2012, p. 128). Slow fashion means accepting diversity, producing in small scale, and trusting the partners, valuing making and maintaining and a true price of the product incorporating ecological and social costs.

Within smart textiles and garments development, the main issue today is to yet explore possibilities, push borders of what is possible and promote values of potential use. It is very much material, technology driven - more as a hack to prove that something can work, rather than fulfilling a need and growing upon that. Crafting smart textiles is a slow process, hands-on experience, it allows craftsmen to grow together with their creation and the smart textiles to record a narrative, story – tradition.

Because we envision meaningful results from the tension between craftsmanship/connectedness (lower-left) and technology (lower-right). We may expect inspiring design. In figure 1, we can see the existing axes from culture (upper-left) to technology (upper-right). Our approach is to explore the design options of where these two come together. Because we envision meaningful results from the tension between crafts/culture and modern technology, our approach is to place within the final concept.

The beauty of the approach lies not only in the integration of traditional local colors and patterns with new technologies but also in the values, which have been taught through family-line for centuries. Maybe the bed sheets could tell a predefined story or be configured by users. For example, sheets with Danish colors would tell a bedtime story that, while scanned, start telling a fairy-tale that originates from other kind of inputs.

Furthermore, to ask the question, how could traditional craft support or guide technology as a new craft, Kristi experimented QR-coded Traditions concept can be seen as a physical representation of a virtual value. May it be connected to a local wisdom, inspiring quote, personal message from a friend, fairy-tale, history of the product, or to a certain database of information.

QR-coded Traditions
Looking into such developments Kristi Kuuki wanted to incorporate some of the forgotten old wisdom into the new possibilities of digital and otherwise new technologies. While approaching the integration of textiles and technology she aimed to show that, through also, see how new ways of communicating can be achieved. Each step means improving from inside. Biomimicry - another exciting emerging field - “...is not simply a tool for copying. Rather it is understanding and applying principles for success simple at their core - that is more the point.” (Fletcher and Grose, 2012, p. 115). That means changes starting from material level up to processes and proposals for seeing completely different, in harmony with nature, business models.

Slow is not a simple description of speed. Rather it represents a different worldview that names a coherent set of fashion activity to promote the pleasure of variety, the multiplicity and the cultural significance of fashion within biophysical limits. Slow fashion requires a changed idea of what to wear throughout our lives goods” (Fletcher and Grose, 2012, p. 128). Slow fashion means accepting diversity, producing in small scale, and trusting the partners, valuing making and maintaining and a true price of the product incorporating ecological and social costs.

Within smart textiles and garments development, the main issue today is to yet explore possibilities, push borders of what is possible and promote values of potential use. It is very much material, technology driven - more as a hack to prove that something can work, rather than fulfilling a need and growing upon that. Crafting smart textiles is a slow process, hands-on experience, it allows craftsmen to grow together with their creation and the smart textiles to record a narrative, story – tradition.

Because we envision meaningful results from the tension between craftsmanship/connectedness (lower-left) and technology (lower-right). We may expect inspiring design. In figure 1, we can see the existing axes from culture (upper-left) to technology (upper-right). Our approach is to explore the design options of where these two come together. Because we envision meaningful results from the tension between crafts/culture and modern technology, our approach is to place within the final concept.

The beauty of the approach lies not only in the integration of traditional local colors and patterns with new technologies but also in the values, which have been taught through family-line for centuries. Maybe the bed sheets could tell a predefined story or be configured by users. For example, sheets with Danish colors would tell a bedtime story that, while scanned, start telling a fairy-tale that originates from other kind of inputs.

Furthermore, to ask the question, how could traditional craft support or guide technology as a new craft, Kristi experimented QR-coded Traditions concept can be seen as a physical representation of a virtual value. May it be connected to a local wisdom, inspiring quote, personal message from a friend, fairy-tale, history of the product, or to a certain database of information.

QR-coded Traditions
Looking into such developments Kristi Kuuki wanted to incorporate some of the forgotten old wisdom into the new possibilities of digital and otherwise new technologies. While approaching the integration of textiles and technology she aimed to show that, through also, see how new ways of communicating can be achieved. Each step means improving from inside. Biomimicry - another exciting emerging field - “...is not simply a tool for copying. Rather it is understanding and applying principles for success simple at their core - that is more the point.” (Fletcher and Grose, 2012, p. 115). That means changes starting from material level up to processes and proposals for seeing completely different, in harmony with nature, business models.

Slow is not a simple description of speed. Rather it represents a different worldview that names a coherent set of fashion activity to promote the pleasure of variety, the multiplicity and the cultural significance of fashion within biophysical limits. Slow fashion requires a changed idea of what to wear throughout our lives goods” (Fletcher and Grose, 2012, p. 128). Slow fashion means accepting diversity, producing in small scale, and trusting the partners, valuing making and maintaining and a true price of the product incorporating ecological and social costs.

Within smart textiles and garments development, the main issue today is to yet explore possibilities, push borders of what is possible and promote values of potential use. It is very much material, technology driven - more as a hack to prove that something can work, rather than fulfilling a need and growing upon that. Crafting smart textiles is a slow process, hands-on experience, it allows craftsmen to grow together with their creation and the smart textiles to record a narrative, story – tradition.

Because we envision meaningful results from the tension between craftsmanship/connectedness (lower-left) and technology (lower-right). We may expect inspiring design. In figure 1, we can see the existing axes from culture (upper-left) to technology (upper-right). Our approach is to explore the design options of where these two come together. Because we envision meaningful results from the tension between crafts/culture and modern technology, our approach is to place within the final concept.

The beauty of the approach lies not only in the integration of traditional local colors and patterns with new technologies but also in the values, which have been taught through family-line for centuries. Maybe the bed sheets could tell a predefined story or be configured by users. For example, sheets with Danish colors would tell a bedtime story that, while scanned, start telling a fairy-tale that originates from other kind of inputs.

Furthermore, to ask the question, how could traditional craft support or guide technology as a new craft, Kristi experimented QR-coded Traditions concept can be seen as a physical representation of a virtual value. May it be connected to a local wisdom, inspiring quote, personal message from a friend, fairy-tale, history of the product, or to a certain database of information.

QR-coded Traditions
Looking into such developments Kristi Kuuki wanted to incorporate some of the forgotten old wisdom into the new possibilities of digital and otherwise new technologies. While approaching the integration of textiles and technology she aimed to show that, through also, see how new ways of communicating can be achieved. Each step means improving from inside. Biomimicry - another exciting emerging field - “...is not simply a tool for copying. Rather it is understanding and applying principles for success simple at their core - that is more the point.” (Fletcher and Grose, 2012, p. 115). That means changes starting from material level up to processes and proposals for seeing completely different, in harmony with nature, business models.
New valuable concepts can be achieved mixing traditional and new in different levels. There are various approaches possible to take to integrate technology and crafts. We have done series of explorations in Eindhoven Technical University (TU/e), Industrial Design, Wearable Senses theme. And based on that we are making first attempts to create a mutual language to talk about crafts mixed with technology.

During a project TechCrafts Bachelor students started up each getting to know one craft rather deeply. They researched about weaving, silversmiths, crocheting, knitting, bobbin lace making etc. and found themselves a master of the specific craft to learn from. From practicing the skill, they took a step further and started to merge the old technique with new materials and electronics keeping in mind what the craft traditionally had served for. The intention was to learn the wisdom of the old craft and to bring it into today, not as a museum would do - preserving it, but hacking, cracking, re-thinking and inventing way.

Unlace (Fig. 3) is an interactive lace lingerie garment which allows two-way interaction for the piece to react on touch and heat up thermochromic yarns, while also the interactive change invites and guides the touch into desired places. Combining bobbin lace making together with its values of slowness and details with new smart materials, we have a very delicate piece of technology.

Morrow (Fig. 4) is a fence made for climbing plants. The stimulating lights will turn on when a person interacts with the fence. In this way the plants will grow towards the light. It creates a moment for observation and realization between plant and the one taking care of it.

Intimacy tower (Fig. 5) is a circular woven tower that uses the textile to represent the complexity of one’s inner self and the growth of it with his experience. It plays with the privacy and the allowance to reach it. The goal of the tower is to create empathy between people that have the same experience at the same time.

**Discussion**

“Technology can be part of the actual textile (e.g. smart textiles), a tool for their creation (e.g. the software CAD), or used to manipulate the input (e.g. using wearable technologies).” (Seymour, 2008 p. 173). From the described and other realized projects conducted in TU/e we can see that the concepts developed through making with one’s hands and learning straight from a master even after combining with high technologies still carry the core values of the craft started with. And even if the prototypes are not technically perfect, they incorporate a strong value for relationships between people or environment and people. “Skills are also a certain way against superficiality. Skills lead to quality, to refinement, to depth.” (Trotto, 2011, p. 42).
The Nordic Textile Journal

Higher the spirit of our material world appears on the basis of physical resources that we do not have, and waste we have nowhere to hide. Perhaps the first change we should make is to stop producing and consuming things we do not really need that make the waste that no one wants, especially waste that is toxic to ourselves and our fellow beings on this planet.” (Pauli, 2010, p. 7) Toxic waste is a gentle topic around smart garments. Let’s make really sure to learn from what fashion industry is already able to teach us today, to treasure quality over quantity, trusting relationships over dependency and meaningful applications guiding people to that direction.

Conclusion

Clothes and objects provide a crucial “carrier” service, helping to bond the relationships between others and us and with the society as a whole. The connected relevance of things to people through change or novelty is essential in this context, for all of these relationships are in constant flux as our own perspectives and the values of society co-evolve (Fletcher and Grose, 2012, p. 138).

Textile industry is heading towards smart and interactive garments valuing our need for connectedness and sharing. With lost craftsmanship approach to drive for detail and quality and values applied through tradition and rituals, craft techniques and the hands-on approach this next stage could be ecologically more responsible stepping stone for the next era approaching.

Acknowledgments

We thank the TechCrafts students of the Industrial Design Department at the Technical University of Moscow, more specifically Eef Luliers, Liza Blummel, Orfeas Lyras whose work was presented in the current paper. In part the Dutch government – our most valuable resources. The rapid prototyping tools and digital technology can be seen as a key element here. With time craft the path for it.

References


Hirvonen, P. (2009). Ornaments used to protect, cleanse, heal and also communicate – our most valuable resources. The rapid prototyping tools and digital technology can be seen as a key element here. With time craft the path for it.


The Worn, The Torn, The Wearable: textile recycling in Union Square

David Goldsmith
The Swedish School of Textiles, University of Borås
david.goldsmith@hb.se

Abstract
This narrative focuses on one aspect of the growing phenomenon of textile recycling: the act of “getting rid of” one’s no longer wanted clothing. The story here derives from many visits to Wearable Collections, a business that collects apparel (as well as towels, sheets, shoes, and other textiles) with an “inlet” at the popular Union Square Greenmarket in Manhattan. Over several months, I watched hundreds of individuals drop off thousands of kilos of materials for recycling and talked with many of them about what they were doing and why they were doing it. This investigation was undertaken for two purposes. On one hand, it was a device for practicing a variety of ethnographic field methods to support my current Ph.D. action research with enterprises aiming to build more sustainable fashion systems. On the other hand, it was a means to gain knowledge of what is happening with textile recycling in New York City. The pages that follow have been excerpted from a longer and broader account.

The term textile recycling is used here broadly. It encompasses upcycling (for example, making a dress from old dresses, or producing yarn from trimmings from garment manufacturing); downcycling (such as shredding worn out textiles for insulation); practices such as selling, swapping, or giving away; and any other ways of reusing or repurposing that saves — or at least delays — textiles from being buried in landfills or otherwise wasted.

Keywords: textile recycling, second-hand clothing, textile waste management, sustainable fashion, Union Square Greenmarket

Introduction
Give me your tired [trousers], your poor [pajamas], Your huddled masses [of clothing] yearning to breathe free, The wretched [but recyclable] refuse of your teeming shore. Send these, the homeless, tempest-tost [textiles] to me, ...

with apologies to Emma Lazarus, poet of “The New Colossus” that is associated with the Statue of Liberty.

Increasing the amount of textiles that are recycled — whether as clothes to be worn again, repurposed into rags or bespoke suits, or in other ways made useful, such as for cleaning rags or fuel — is often thought of as one of the ways human beings might mitigate the damages caused by the intense appetite of the fashion beast (Council for Textiles Recycling 2012; Fisher et al. 2008). By weight, New York City’s residential (non-industrial) textile refuse is about seven percent of the total amount of trash that...
ends up in landfill (DSNY 2011), or about 181 million kilos. This translates into about twenty-five kilos per each of the 8.18 mil-
lion (US Census Bureau 2011) city residents. This compares with Sweden’s rate of nearly eighteen kilos of clothing and textiles
disposed per person annually (PRODCOM in Cato 2010: 9). This
does not represent the potential environmental, economic, and social or cultural benefits that the widespread recycling of textiles might yield, but it should be noted that in terms of life cycle assessment (LCA) the recycling of cotton, linen, so
cils, polyester and wool into new yarns and fabrics, or repurposing of garments through reconstruction or other secondary uses does
behave similarly to other recycling processes. To fabric and garment production from “virgin” materials (Wang 2006; Farrant et al. 2010; SMART 2011; Textile Exchange 2012). Yet, wear-
able textiles have been studied in the realm of textile recycling. However, if the high
costs of recycling are not matched by social or cultural benefits that the widespread recycling of textiles
would bring, then the action of recycling textiles at least shows a willingness on the part of consumers to do something
about it without monetary compensation for the “donors”.

Recycling in the City
Recycling of many materials was common in the city before World War II, but it fell out of practice soon after and was not
resumed until modern day curbside collection of textiles began in 1986. In 1989, recycling became mandatory where services
were provided, and by 1997, all of the five boroughs, Manhattan, The Bronx, Staten Island, Queens, and Brooklyn were
incurably separated into seventeen distinct collection zones (DSNY, Clothing Action Plan 2010), it would be a positive change. Meanwhile, 2000 to 2011: 40), and John Ehrenfeld (2008) who advocate

The Nordic Textile Journal
I have been through this area thousands of times since the early 1980’s when I moved to a nearby neighborhood. At that time Union Square Park was a bleak, litter-strewn zone where you could see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

In 2012, due to the decades long resurgence of New York’s economy, the rehabilitation of the park and the subway station underneath it, influx of students and young people seeking once-affordable housing, and the popularity of the farmers market itself, the area is now charged with trendy and fashion outlets such as Forever 21, Diesel, American Eagle, international chain stores: Staples, Barnes and Noble, Best Buy, so cheap? On the streets around the park are local, national and international chain stores selling low quality textiles such as sheer cotton-polyester sheets, similarly sleazy printed vinyl “damask” curtains, snagged terry cloth towels, kitschy embroidered dishcloths, and flatly utilitarian floral-patterned house smocks.

The morning air was chilly and the sky clear blue like early November should be. The sun was bright at guests of all ages or seven large grey polyethylene garbage bags being filled with rotting fruit and vegetable scraps carried here by those New Yorkers dedicated enough to divert their kitchen compostables to Manhattan’s curbside composting program (MTA 2011). Everyday, in addition to the crush of inhabitants and commuters going to and from work, it seems that American tourists from every state of the country and commuters going to and from work, it seems that American tourists from every state of the country and Europeans, or where I occasionally got up the nerve to sit for a few minutes time, but judging from the waist-high, five by three meter pile of filled-closed nylon laundry bags. No one else was with him at the chair and waiting to help people with their incoming “dona-
tions”. He was wearing a hoodie, and jacket trimmed with fake fur, surrounded by maybe twenty-five or thirty already-filled and tied-closed nylon laundry bags. Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly,

Another category that Evan spoke about was people who ask for money. He said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.

Another category that Evan spoke about was people who ask for money. He said that he has come to understand that textile recycling is a “greatly overlooked area”. After thinking about recycling, he said that he has come to understand it was also a place to see people sell, buy and use drugs openly, and to firstly study the physical setting, including the public restroom, one of very few in the entire city.
The market was very busy; people seemed energized by the crisp, sunny day that it is sold to a sorting facility; that useable clothing is washed (and aren’t leather!). Fletcher’s originals.

Garments that are made up of interchangeable pieces that show or tell the story of how they have been used

Garments that are regularly worn and have never been washed (and aren’t leather!) those that are washed

Garments that show or tell the story of how they have been used

Garments that are regularly worn and have never been washed (and aren’t leather!) those that are washed

Garments that show or tell the story of how they have been used

Garments that are regularly worn and have never been washed (and aren’t leather!) those that are washed
Garments that catch your attention each time you wear them [those that are boring];

Garments worn in ways that reinforce or defy the producer’s [or wearer’s] values [those that are silent about values];

Garments that connect us to others and/or remind us of our potential [those that have forgotten to remind us of our potential];

Garments worn in response to changing economic and environmental [social, or cultural] concerns [those that are boring];

Garments that are adapted over and again to meet changing needs [those that have forgotten];

Garments that are perfect for you [those that you do not connect with];

Garments that can be consigned to a vintage shop. Why are you giving them away? [those that are boring];

That looks comfortable.

You know those pills [the small balls of fiber that collect on the surfaces of some fabrics] can be scraped off.

That looks neat.

Looks like you’ve had them for a long time.

Didn’t your sister want these skirts?

Did you know that those t-shirts are going to be sent to Chile?

Don’t you hate when socks wear out in only that one spot?

It was remarkable how easily people spoke in response to my prompts, and remarkable how unremarkable most of their comments were:

Oh, that skirt never really fit me right.

I have too many of these.

My girlfriend told me to clean out my closets.

I didn’t want to throw this stuff in the trash.

Bringing it here is better than throwing it out.

I liked it when I bought it, but I never wore it.

I wore that a long time, but it’s falling apart.

I just decided to get a bunch of new clothes, so all of this had to go.

I’m going back to Korea, and I don’t want to bring all this with me.

I don’t know where a lot of this came from. I can’t remember where I bought it.

The colors used to be nice, but they look old now.

I lost weight and have to get rid of all this, otherwise, I’ll gain it back.

I don’t remember having so much crap to get rid of in the day.

Some of it I just got tired of wearing, some doesn’t fit right.

Usually I put my old clothes on the street, but this street seems like a better idea.

There’s no Goodwill near me.

I never really thought about what happens to this. Does it go to Staten Island? (Staten Island, a borough of New York City was until recently home to one of the world’s largest landfill[s].)

If this place wasn’t here, I’d just put all it in the garbage or maybe give it away, but nobody really wants it.

My kids grew out of it, and my friends’ kids are too old for it.

I tried selling it myself, but it wasn’t worth my time.

I heard that bedbugs like old clothes, so I’m not taking any chances.

It feels creepy, which is weird, ’cause when I got it I thought it was cool.

My apartment is so small, I don’t have space to have anything that I don’t wear.

It’s easier to get new stuff.

If the above comments, most of which were collected during subsequent visits, were mundane they seem to reflect the dull relationship many people in consumption societies have with much of their (industrially-produced) clothing. (I cannot recall seeing any handmade items being discarded.) The flash interviews were very productive, so if this project continues, it would be an effective means for establishing patterns that either fit my inversions of Fletchers categories, or point to other reasons why people abandon/recycle their garments.
Homeless Man, Compelling Couple

Not everyone who comes to Wearable Collections wants to give away things. At least one person every time I visited the site wanted to be recipient of clothing. Not counting a woman who drunkenly bartered and begged to buy a paisley purse (and then decided it was not worth the impromptu agreed upon price of ten dollars) and a man who was quite obnoxious and needling and struggling to get by. The WC workers are not encour- aged to give out clothes — it is easy to see how the site could be undermined by just giving it all away. My question, and then we proceeded to have a twenty-minute long con- versation. She told me that she did not have anything to drop off at that particular time, but that she was in fact a regular, and then went to sit on a bench. Periodically, when something was dropped off at the site, Evan, another volunteer, would go through it and decide if for the man who came back later in the day. A similar event happened on another day, when a couple, both in their thirties and whose names were not given, were watching us talking and then went to sit on a bench. Periodically, when something was dropped off at the site, Evan, another volunteer, would go through it and decide if for whom she worked. She was wearing an activewear jacket of a brand I didn’t recognize that fit her more closely than a North- face jacket, and of itself. During that conversation, she told Evan that she was not interested in talking about fashion or textiles, but was actually from Bloomingdale’s department store. So in essence, the site was the beginning of a process of rethinking what it means to give away clothes, and to recycle textiles, one must first have excess material wealth. The Too-Short-to-Keep Sweater Leaver

A young woman whose accent I could not place, styled in classic, grey-blue graphics, had a large clear plastic bag packed with various clothes. I thought she resembled the Indian silk scarf that we discussed because it was so pretty. She was wearing a wool sweater, black-framed eyeglasses, and a picture, but in her woolen whirlwind I saw two bicycle baskets, one purple scarf was caught up in her curly red hair, and she had, wool pom-poms tied to her shoes. I imagined that like a super- hero who had transformed her motorcycle into a school bus, she may have even dyed the wool herself. She did not have any textiles to be recycled, however: only her stop was the comp. Whole Clothes Man

A handsome man, late twenties, perhaps one of the fashion- models living nearby, came over with two loaded shopping bags. One bag was glossy and printed with the narrow multi-color horizontal stripes seen on Paul Smith branded scarves and socks, but was actually from Bloomingdale’s department store. Still, he was asking if he could drop off some old clothes. Indeed, a coat came in, and Evan held it for him. A similar event happened a day later. A woman, about forty years old, obviously home- less, had only a pair of blue jeans that she needed a warm jacket. Evan was not willing to dig around in the bags for clothes, but he did say that if a coat came in he would hold it for him. Indeed, a coat came in, and Evan held it if the person for whom he worked. She was wearing a clothing brand that she did not recognize. For the man who came back later in the day, it was a woolen whirlwind. When something was dropped off at the site, Evan, another volunteer, would go through it and decide if For the man who came back later in the day, it was a woolen whirlwind. When something was dropped off at the site, Evan, another volunteer, would go through it and decide if for
the overall consumption of textiles. If we reach a point, in New York City or elsewhere, that people are wearing garments, and using towels, sheets, and other cloth products that are made of recycled materials instead of (and not in addition to) those made from new resources, textile recycling will have a much clearer value. It could happen. Industrially produced, and one-off clothing made from recycled materials are increasingly available. (Of the many producers, see for example sustainsolutions.com or junkystyling.co.uk.) At the moment however, even if what I heard and saw was true, (2007, 2004-05 NYC Residential and Street Basket Waste Characterization Study) I feel somewhat optimistic and energized, I will keep in mind environmentalist John Ehrenfeld’s remark that, “Reducing unsustainability will not create sustainability” (Ehrenfeld 2008: 20).

References
Baruchowitz, Adam. May 2012. Personal communication.
Fletcher, Kate. November 2011. Personal communication.

The Nordic Textile Journal
Multifarious Approaches to Attain Sustainable Fashion

Dr. Nidhi L. Sharda, Mr. Mohan Kumar VK
Dept. of Knitwear Design, National Institute of Fashion Technology, Bangalore
nidhilsharda@gmail.com

Abstract
Fashion is a huge industry and affects environmental, economic and social system in many ways. Exploitation of resources for ever changing trends in fashion is immense and providing these demands put enormous pressure on the environment. In such a situation sustainable practices in every human activity has become important and fashion is not less affected by this drive. Fashion professionals have to play major role to inculcate the concept of sustainable fashion with responsibility in their product line. It is important that while designing, designer should understand the benefits of sustainable operation starting with concept development level. In this paper design solutions for sustainable fashion are inferred in a design school scenario. The main idea to do so is to develop more sensible and responsible designs, which can be better solutions for sustainable fashion. The sustainable fashion was achieved to a certain extent by using available materials to its ultimate usage, using waste material, recycling of the products, planning second life for the fashion product, slowing down the fashion etc.

Keywords: slow fashion, sustainability, fashion design, haute couture, textile re-use, functional design

In 1918 Mahatma Gandhi started his movement for Khadi as relief programme for the poor masses living in India’s villages. Spinning and weaving was elevated to an ideology for self-reliance and self-government. Every village shall plant and harvest its own raw-materials for yarn, every woman and man shall engage in spinning and every village shall weave whatever is needed for its own use. Khadi Movement was– A true approach for sustainable living through sustainable clothing. (Prabhu R K, et.al 1960)

Fashion is a huge industry and influences environmental, economic and social systems in many ways. It is known fact that phenomenal amount of textile waste that enters landfills each year, fashion industry’s sizable water-and-energy footprint is a great concern for environmentalist today. While having many economic benefits, clothing has a significant environmental and ethical impact ranging from increased carbon emissions, waste, water usage and pollution to child labour and unfair trading conditions. In February 2009, the UK Government Department for the Environment, Food & Rural Affairs (Defra) launched the Sustainable Clothing Action Plan. The research and consultation that preceded the action plan brought together over three hundred UK fashion & textile organizations, from high street retailers, to designers and textile manufacturers to battle the environmental impacts of fashion industry. (Defra 2008)

Sustainable fashion is not a trend. It is way of designing the styles as per positive future demands. (Dickson M, et al.2012), It is a part of the larger trend of “ethical fashion”. 

In 1918 Mahatma Gandhi started his movement for Khadi as relief programme for the poor masses living in India’s villages. Spinning and weaving was elevated to an ideology for self-reliance and self-government. Every village shall plant and harvest its own raw-materials for yarn, every woman and man shall engage in spinning and every village shall weave whatever is needed for its own use. Khadi Movement was– A true approach for sustainable living through sustainable clothing. (Prabhu R K, et.al 1960)

Fashion is a huge industry and influences environmental, economic and social systems in many ways. It is known fact that phenomenal amount of textile waste that enters landfills each year, fashion industry’s sizable water-and-energy footprint is a great concern for environmentalist today. While having many economic benefits, clothing has a significant environmental and ethical impact ranging from increased carbon emissions, waste, water usage and pollution to child labour and unfair trading conditions. In February 2009, the UK Government Department for the Environment, Food & Rural Affairs (Defra) launched the Sustainable Clothing Action Plan. The research and consultation that preceded the action plan brought together over three hundred UK fashion & textile organizations, from high street retailers, to designers and textile manufacturers to battle the environmental impacts of fashion industry. (Defra 2008)

Sustainable fashion is not a trend. It is way of designing the styles as per positive future demands. (Dickson M, et al.2012), It is a part of the larger trend of “ethical fashion”.

Keywords: slow fashion, sustainability, fashion design, haute couture, textile re-use, functional design

In 1918 Mahatma Gandhi started his movement for Khadi as relief programme for the poor masses living in India’s villages. Spinning and weaving was elevated to an ideology for self-reliance and self-government. Every village shall plant and harvest its own raw-materials for yarn, every woman and man shall engage in spinning and every village shall weave whatever is needed for its own use. Khadi Movement was– A true approach for sustainable living through sustainable clothing. (Prabhu R K, et.al 1960)

Fashion is a huge industry and influences environmental, economic and social systems in many ways. It is known fact that phenomenal amount of textile waste that enters landfills each year, fashion industry’s sizable water-and-energy footprint is a great concern for environmentalist today. While having many economic benefits, clothing has a significant environmental and ethical impact ranging from increased carbon emissions, waste, water usage and pollution to child labour and unfair trading conditions. In February 2009, the UK Government Department for the Environment, Food & Rural Affairs (Defra) launched the Sustainable Clothing Action Plan. The research and consultation that preceded the action plan brought together over three hundred UK fashion & textile organizations, from high street retailers, to designers and textile manufacturers to battle the environmental impacts of fashion industry. (Defra 2008)

Sustainable fashion is not a trend. It is way of designing the styles as per positive future demands. (Dickson M, et al.2012), It is a part of the larger trend of “ethical fashion”.

Keywords: slow fashion, sustainability, fashion design, haute couture, textile re-use, functional design
Development of Sustainable Fashion Design

The objective of this exercise was to develop strategic thinking in designing in order to achieve viable solutions for sustainable fashion designing. Since fashion caters to psychological utility than functional utility, the normal lifecycle of a fashion product lasts for one season. The idea of this exercise was to approach designing in such a way that the overall life cycle of the product can be increased, resulting in conservation of material, time and energy involved. For this study, few examples are analysed. The observations made are as follows:

1. **Wardrobe Staple Piece**: A rule to a wardrobe – QUALITY NOT QUANTITY!! Clothes that liked by the consumer not only for one season but for many seasons, a garment that can be coordinated with many separates in your wardrobe, it is flatting, comfortable, versatile, well-made can be called a Wardrobe Staple Piece. Following examples are analysed under such season less wardrobe staple pieces.

   Design 1A is created by intensive surface developments. The theme worked upon was transformation and therefore layered surfaces with different visual appeal were used so that the look of the garment can be changed for different occasions and therefore can be utilised for more occasions.

   In Design 1B use of traditional beads which are very expensive and carries regional prosperity symbol were used to make a garment exclusive. The garment has a characteristic of cultural connect at the same time is made in very contemporary manner thus can become a staple piece in the wardrobe to be retained for many years. It can be worn with various combinations with exclusivity in design and therefore makes a staple piece.

   Design 1C is a very traditional silhouette of Hariyan region of India. The garment has a characteristic of cultural connect which does not vanishes with time. This is again an example of a designer wear which can be worn in contemporary as well as in traditional context by the wearer thus making it staple wardrobe piece.

Multi-Functionality of Garments: By creating garments that do more with less, multifunctional garments (also called convertibles or transformers) are articles of clothing that can be worn in more than one way or that serve multiple purposes. They can usually be altered by utilizing attached strips of cloth, ties, buttons or other built-in modifiers. As shown in figure no. 2 a top can be altered by zipper in the form of bag for a varied utility.

**Fig 1A, 1B, 1C**: Wardrobe staple pieces

**Fig 2**: A stylish top can be converted as back-pack

3. **Re-Construction - second life**: For achieving the psychological and functional utility of a fashion product, the design process was modified to design two life cycles for one fashion product. Also, the transformation of one life to the other was planned in the design process itself by the students. After analyzing the evaluation, conclusions were made as follows:

- **Prototype Development for First Life & Conversion to Second Life if planned** (Note: This assignment was not designed as an empirical experiment to test and evaluate teaching methods and models in a strict sense).

**Fig 2**: A stylish top can be converted as back-pack.
the recorded studies, it can be concluded that the design of a product can be done keeping its second life in consideration. A thorough research about long term fashion trends is important in designing the extended life cycle of the product. A designer can incorporate simple and convenient methods to transform a product from its first life to its second life. As shown in Fig. 3A, a tunic top after complete utility can be converted into a backpack by the user with slight manipulation. Fig. 3B, a designer tube top and smoked skirt can be used as decorative cushions and bag in second life.

4. Emotive Designing for Slow Fashion: For a fashion to be used for prolonged period aesthetic is important factor. The design should possess a characteristic to be called a classic product and will not have scope of being obsolete. (Abitslow, 2011). It should have expertise or virtuosity, utilitarian pleasure, style and special focus. Fashion that appeal emotionally-possessions those are close to heart, favourite and gratifies emotional needs will last for longer period with the user and can lead to slowing down the pace of fast changing fashion. Consumers can use the fashion product for longer period for various emotional needs viz; being connected to loved ones, feeling stylish every time they wear it, finding enjoyment, feeling stylish. With this aspect designs were developed are discussed below.

In design 4A an attempt was made to use father’s old shirt to make a completely new dress which can be worn frequently an innovative example of emotional connect by recycling the material thus achieving slow fashion.

In design 4B, cultural and emotional values were used to design a garment. Motifs were derived from the regional folk art of Kerala in India called ‘Theyyam’. Client’s mother’s sari was used for making complete new designer outfit. The garment since has emotional and cultural connect therefore such fashion garment can be enjoyed by the user for prolonged time thus reducing down the pace of fashion.

In design 4C inspiration is taken by a custom called papad file in Jain cult where in blessing is given in the form of papad file. This garment again carries emotional connect in the form of wishes by her family, making this garment a special to be possessed for life.

5. Reduce Material & Process Using Modern Technology (seamless)

Incorporating seam less technology for the production of mass customised garment a single fabric can be varied in styles in terms of silhouette viz; A line, tulip, and with side cowl. Length of the garment can also be adjusted as per design and size requirement of a client. By using this design intervention consumers will have access to a variety of relatively low cost, varied style, customized apparel. It is a commercially viable design intervention as it does not involve additional requirement in terms of raw material, processing time or infrastructure. Moreover unlike conventional garment construction technology where there is lot of wastage of material for pattern development, it involves no wastage, hence it certainly leads to sustainable fashion.
6. **Recycle - best out of waste:** Re-cut and sew vintage clothing, or use unusual materials to create truly different fashions, recycled clothing is the greenest option. In this approach to achieve sustainable fashion designs were developed by textile materials which were of no use. In figure 6A worn out and trend out denim trousers were used to develop a jacket with trendy hood. In design 6B old phulkari suit of grandmother was redefined by denim trousers were used to develop a jacket with trendy hood. Sustainable fashion philosophy enables designers to create unconventional and innovative designs against an obsolete product line. After analysing the recorded studies, it can be concluded that the design of a product can be done keeping environmental concerns into consideration. A thorough research about long term fashion trends, endurance for classics. Developers ability in teaching itself gives students a wider perspective to think design in a more holistic manner and to become sensitive and sensible towards environment while designing.

7. **Choosing Artisans Products to Support Small Craft:** Poverty is the social and economic system that makes most of the artisans in India vulnerable depriving their access to basic need for their livelihood. Cultural diversity provides wide variety of art and craft product as daily part of their living. The art of making crafts can be used by the fashion designers thus contributing to an economic and social sustainability.

8. **Modular Clothing:** Making a garment with easily detachable finished components will give a wearer multiple options in design. It was able to build an intuitive approach towards the extended life of a product thus driving momentum for slow fashion. Sustainable fashion philosophy enables designers to create unconventional and innovative designs against an obsolete fashion product.

which in turn will lead to reduced manufacturing and which eventually will turn out to be less usage of raw material. Conclusion

Few innovative thoughts applied by the students in design development to attain sustainable fashion were, by adding emotional value to the design, planning second life of the product, reusing material, able to make allied business like crafts using modern machine in certain instances and by increasing longevity of fashion etc. This understanding of sustainable design philosophy was able to develop important designer skills amongst the students which otherwise were never taken into consideration. This teaching experiment resulted in:

- Enabled logical understanding of the design process by the design students.
- Made the students understand sustainable design philosophy to comply with the principles of economic, social, and ecological sustainability.
- Developed Intuitive approach towards the extended life of a product in order to use resources to its optimum level.
- It enhances an ability to understand and apply long term fashion trends, endurance for classics.
- Develops ability to think design with a sense of responsibility
- Endure the extendence of the material used beyond the product’s short life (trend).
- It was able to build an intuitive approach towards the extended life of a product thus driving momentum for slow fashion.
- Sustainable fashion philosophy enables designers to create unconventional and innovative designs against an obsolete fashion product.

After analysing the recorded studies, it can be concluded that the design of a product can be done keeping environmental concerns into consideration. A thorough research about long term fashion trends, endurance for classics. Developers ability in teaching itself gives students a wider perspective to think design in a more holistic manner and to become sensitive and sensible towards environment while designing.

**References**


Sagar Iou. (2011). Slow fashion is not a trend: it’s a movement, oldschoolventures.com, New York, (accessed May 2012)

Rethinking Available Production Technologies – the case of a thermally insulating footwear concept

Nils-Krister Persson, Anna-Carin Jonsson, The Swedish School of Textiles, University of Borås
Nils-krister.persson@hb.se, annacarin.jonsson@gmail.com

Abstract
Consumption reduction is often regarded as profound for sustainability. The overwhelming studies are on the general public and its behaviour. Here we discuss a way for the company to lower consumption by avoiding inventory investments. Added value in terms of sustainability can be gained by using standard manufacturing technologies frequently found in the textile industry to produce new products beyond present paradigms. Specifically we develop knitting techniques on a circular knitting machine to enable production of a thermally insulating textile composite for a multi-component footwear system. Four cornerstones defined the project; sustainability, availability, comfort and flexibility. The first two relate here to the production, while the last two are coupled to the wearer’s experience of the product.

Two key questions initiated this project. The first question elaborated on the possibility to produce an untraditional material for a new type of product on a circular knitting machine, which is generally used for high speed production of full-width fabrics. The second question explored the possibility to apply the three-layer principle - generally used in sportswear - on footwear. We show that we can answer both these questions positively.

Using an elaborated functional design tool the footwear system was theoretically divided into functional layers; inner, middle and outer, combined with an inner and outer sole. These detachable layers together create a flexible footwear system. A ready-made product, the middle layer with thermal insulating properties, was practically developed, taking use of a heat and water soaking protocol for inducing relaxation in the material and by this air encapsulation.

Keywords: footwear, knitting, three-layer principle, comfort, thermal insulation.

Introduction
Consumption reduction is commonly regarded as profound for achieving sustainability (Allwood, 2006). Talking within a textile context it is for example better to prolong the life span of the T-shirt than buying a new one (Chouinard et al., 2011). The overwhelming focus on consumption studies is on individuals, households and the general public (Newholm and Shaw, 2007). Still investments by companies stand for a...
very large amount of yearly national gross expenditure in many
countries. Any purchase of instruments and machinery creates
a seismic wave through the economy. Energy must be used in the
machine factory. Transport must be performed for moving
the items from the machine plant to the buying company. Oil or
electric energy must be produced for this. Raw materials must be
bought. Old clothes and metals, oil to plastics and so on.
All this adds to the global burden of resource use. Naturally it is
also the case that new machinery is more efficient with energy,
water and chemicals than older generators. Old machine parts
can be reused and metals be re-melt. New equipment can be
placed in geographically better sites than before, minimizing
minimizing the production of emissions and hazardous environmen-
tal impacts. Our focus will be when the company is in a situation
investigating a new equipment purchase that is needed for the
company today. Our focus could be an alternative. By avoiding machine investments, prolonging
the life span of the equipment, but still reaching new markets
and thus being an economic solution. The production process
would be adjusted to the production by the new machine.

The Basis for the Product Development
The project is defined by the following four cornerstones;
• The comfort aspect includes creating, supporting and
maintaining a comfortable microclimate under various kinds
of external climate and levels of physical activity. Comfort
embodies the whole philosophy of psychology – such as size fit, cushioning
(Drez, 1980) etc. These will be of secondary focus here.
• Flexibility refers to the footwear system’s ability to
be convertible in order to suit shifting conditions. For example
adapting to changes in level of activity, changing weather
conditions from outdoor to indoor, from wet to dry or from
dirty to clean.
• Sustainability focuses on resource efficiency from the
perspective of the company. Striving towards optimizing
production processes through minimizing the use of energy
and chemicals, as well as reducing the amount of waste
produced. Packing material, stock and transport should also be
rationalised in order to minimize storage, space, weight and so on.
• Availability focuses on innovative use of existing, acces-
ible and widely distributed production equipment, as well as
developing new techniques and applications for these
machines. Availability focuses on the development of new
knitting techniques on existing equipment rather than
development of new machines. This enables production of
rare components needed to its composite. The pattern of
interconnecting knitting loops, material and after-
treatment, cutting and assembling. Before an elaborate
design process was performed, first described.

The Project(s) of Comfort
Comfort is dependent on the surrounding climate (temperature
and humidity), activity and clothing. Comfort can be divided
in different categories, one example is how the foot is
affected by climate. How it feels when the foot is wet, cool,
hot, dry, comfortable or uncomfortable. Comfort can be
seen as the balance between sensory aspects of the
foot (appr 25% of the time) and supination (appr 75%) (Drez, 1980).
These will be of secondary focus here.

The Concept(s) of Comfort
Comfort is dependent on the surrounding climate (temperature
and humidity), activity and clothing. Comfort can be divided
in different categories, one example is how the foot is
affected by climate. How it feels when the foot is wet, cool,
hot, dry, comfortable or uncomfortable. A too rigid shoe does not provide any greater protection
and impact may affect the gait cycle (Loehm EB et al., 2011).

The Nordic Textile Journal
can in most cases slowly diffuse through the plastic (Wulfinghoff, 1999).

Three Layer Principle, Textiles and Footwear

In order to achieve a comfortable micromilide in different weather conditions and for varying activity levels, the layering principle is frequently used (Ren and Ruckman, 2004, Ruckman, 2005) in various clothing systems, not least in outdoor (Shishoo, 2005), uniform (Scott, 2005), sports (Shishoo, 1995) and footwear (Scott, 2005). The three layer concept is an example of application of the functional decomposition methodology.

The three layer system incorporates materials, each with a specific function, from inner to outer - transport of moisture from the body, thermal insulation and protection against the wind and wetness. The layers are separable so that the system can be regulated by the wearer who can add and exclude layers to achieve comfort. Fundamental in this aspect is the thermal insulation, realised by encapsulation of air to achieve a comfortable micromilide.

To dress a foot resembles the challenge related to dressing the body, with the exception that footwear is often exposed to more harsh mechanical strain than most clothing systems and the sole of the footwear is partly in direct contact with the ground. While a functional clothing system consists of detachable layers which can be freely combined, shoes are often equipped with functional materials only incorporated into the shoe. The division of the clothing into detachable functional layers should be possible to be applied to the foot. This would make it possible for the wearer to divide the footwear in its functional layers, and through this reach comfort giving optimal micromilide.

Textiles play a prominent role for footwear (Kanakaraj and Priya, 2005) being used as lining, upper materials, backing and reinforcement. Even if definitions are un-sharp, most often footwear is only partly consisting of textiles having leather, rubber and plastics as main components. Woven and non-woven are the types of textiles frequently used. Knitwear often has the risk of fraying (Goel, 2010). Still examples of studies of knitted linings exist (Blaga et al., 2011).

For textiles related to footwear moisture and thermal management have been a focus for research (Neves et al., 2011, Bertaux et al., 2004, Ruckman, 2005) in various clothing systems, not least in outdoor (Shishoo, 2005), uniform (Scott, 2005), sports (Shishoo, 1995) and footwear (Scott, 2005). The three layer concept is an example of application of the functional decomposition methodology.

The inner layer is to function to transport moisture away from the body to reach thermophysiological and sensual comfort. To achieve these properties a fibre with low moisture absorption could be used with a suitable knitting structure. If the inner layer is knitted as a bilateral structure, which is connected with distributed knitting loops, the inner layer will act as two socks, hindering the development of blisters as well as more easily transporting moisture away from the foot.

The sole of the footwear is divided into two parts. The inner sole or the footbed, which is located close to the foot, compensates for the differences of the feet, and helps the body into a healthy microclimate through walking. The outer sole is more stretchable, which makes it easy to slip in by pulling the rear end of the sole over the heel and fixating it onto the outer layer of the footwear system. In the present study the capacities of the inner and the following refers to the design and production of that.

Development of Shape

Requirements related to the wearer’s experience of comfort and aspects related to the sustainability and availability of the production process were equally important during the development of the footwear system. Several experiments were conducted using different materials and approaches. From this work a footware shape, meeting the requirements of the cornerstones in varying degrees evolved.

 Orthopedics and physiotherapy have naturally been interested in footwear (Dai et al., 2006, Drez, 1980). Studies has been performed in a context of prosthetics, neuromusculature and rehabilitation (Liu and Fan, 2008) which provides a controlled study on compression of different sock material and friction between these materials and skin. But it is not immediate how these results in the detachable footwear system can be used. For this three dimensional knitted fabric, the middle layer can be designed to enclose large volumes of air, which can work as a buffer to temperature shifts.

Shoes, development of new footwear concepts, and hosiery have been highly interesting from a military point of view (Dyck W, 1992, Rosendal-Bladin, 1988). Even if this literature is huge the technological knitting and production aspects are secondary. Regarding shoes and socks as one system, it’s not new with concepts such as SIS, sock-inside-shoe (Thiry, 2008) and boot-winter or summer insel – outer sock, inner sock (Rosenblad-Bladin, 1988), being presented. But these do not provide a detachable system. The conclusion is that few studies explicitly apply the three-layer principle to footwear.

Principles for a New Footwear Design and Production

To start with, the footwear system was theoretically subdivided into functional layers: inner, middle and outer layer, together with the insole and outer sole. All the detachable layers together form a flexible footwear system, fig 1. Shape and size of one of the author’s (ACJ) feet were used for modelling the footwear layers.

Distributing Functions in Separate Layers

To enable comfort during shifting levels of activity, the footwear must be changeable. This can be done by the wearer, by adding or excluding units. This way of regulating the micromilide can be achieved if the footwear is subdivided into detachable layers, where each layer of the footwear incorporates a function.

The project illustrates how the choices made during product development influence a wide range of aspects, individually for the user and in a wider perspective the production, its availability and environmental issues. Eventually all these aspects can be summed in the four cornerstones that were chosen to frame this project; comfort, flexibility, sustainability and availability.

The outer layer main function is to function to transport moisture away from the body to reach thermophysiological and sensual comfort. To achieve these properties a fibre with low moisture absorption could be used with a suitable knitting structure. If the inner layer is knitted as a bilateral structure, which is connected with distributed knitting loops, the inner layer will act as two socks, hindering the development of blisters as well as more easily transporting moisture away from the foot.

The outer layer main function is to function to transport moisture away from the body to reach thermophysiological and sensual comfort. To achieve these properties a fibre with low moisture absorption could be used with a suitable knitting structure. If the inner layer is knitted as a bilateral structure, which is connected with distributed knitting loops, the inner layer will act as two socks, hindering the development of blisters as well as more easily transporting moisture away from the foot.
The Nordic Textile Journal

The initial experiments were inspired by the Japanese paper folding technique origami (fig 2).

Starting with a rectangular shape (A4) and folding this into three dimensional shaped sketch models, aimed at finding a space filling three-dimensional (3D) shape where its two dimensional (2D) shape tessellates the plane. In this way the material could be utilised efficiently and the laying of the pattern is made easy as well as that the amount of sewing is reduced.

Further test shapes were constructed in textile and modelled on the foot in order to give an idea of the shape and fit of the footwear. A range of different test models evolved during this phase. The choice of the models was based on the four corner-stones and the gestalt interplay between parts and wholes. The formation of the pattern for the footwear aimed at achieving in a way to communicate how the forthcoming 3D shape would be formed, which is in line with the cornerstone concerning efficient production.

Minimizing the amount of material used to produce one footwear unit, including waste material cut away in the production, as well as utilizing a larger percentage of the material, leads to more efficient production, and economizing with materials.

The same shape is used in all the layers of the footwear. This makes the production easier. It also gives the separate layers a common idiom, in spite of the difference in material and structure.

Introductory Production Remarks

Since the circular knitting machines are mainly used for high speed production of full width fabrics, it is a challenge to develop a structure that will enclose air and hold it still inside the textile composite, meanwhile being possible to be produced on this kind of machine.

A circular knitting machine with two needle bars can technically produce a bilateral textile structure without connecting points and thereby the materials can be detached from each other. In order for these two sides of the knitted structure to be separated from each other and thereby be able to encapsulate air, a non-knitting filling yarn can be incorporated between the material layers, connecting loops or five loops not interconnecting in a row (course). The machine can be programmed either mechanically, or digitally by translating a drawn pattern of knitting loops into binary language (knit or do not knit). In most cases a combination of these two ways, mechanical and digital, is used. To enable the circular knitting machine to knit a two layer structure with a non-knitting filling material, several adjustments was made on the machine. The adjustments concerned increasing the distance between the needle beds and lowering the knitting system thread guides to allow the filling material to be lead into the textile structure without interfering with the needles. The loop size and the yarn speed were adjusted individually depending on the task of the knitting system.

Knitting the Composite

Three different patterns were created to experiment with the placement of the interconnecting knitting loops. The patterns were computer drawn. The machine relates to the pattern by reading one pixel as one needle movement.

Depending on the dimension of the knitting loop the pattern has to be adjusted in order to have the right pattern dimensions of the knitted material. The loop measurements can not be foreseen exactly before the structure is knit, so measurements of the loop dimensions were made on the first finished textile (after heat-treatment). As seen on the picture (fig. 3) the patterns including shape tessellates the plane, so every loop interconnects the textile layers, opposed to areas which do not have any interconnect- ing loops. Neither one of these scenarios was optimal. The areas that caused the least amount of problems whilst remaining where the courses either had or did not have interconnecting loops exceeding five to ten loops without interruption. This is due to the incorporation of the non-knitting filling yarn.

Depending on the number of needles that go up into knitting position, the filling yarn is left without guidance from the needle. If many needles in a row go up, or stay down, both scenarios influence the stability of the filling yarn, risking the filling yarn to intertwangle with the needles. Ideally every other needle should go up into knitting position and thus keep the filling yarn on track. On the other hand, to have many binding points in a row on a wale creates no problem since the differ- ence will be balanced by a wale are created separately by different knitting systems.

This ended up in a final pattern with no more than five intercon- necting loops or five loops not interconnecting in a row (course). The pattern of interconnecting loops is large on the upper side of the foot, the filling yarn to allow high insulating capacity. The pattern was scaled down on the sole of the footwear layer to achieve higher stability (fig. 3). The attempt to optimize processes and minimize misunderstandings between production stations lead to the idea of incorporating as much information into the pattern, as possible. Therefore the pattern was designed to have lines, visualised by interconnecting loops, as a guidance to the later process stage of cutting.

Experiments and Results

Circular Knitting Machinery

All experiments were conducted in-house with a double-bedded circular knitting machine OVA 36 with 36 knitting systems, 20 needles per inch, npi, and electronic needle selection. It is equipped with 1872 needles in both the cylinder and dial. The machine speed was 18 rpm. It is imperative that the machine were double-bedded for it to be able to knit a two layer structure. The machine can be programmed either mechanically, or digitally by translating a drawn pattern of knitting loops into binary language (knit or do not knit). In most cases a combination of these two ways, mechanical and digital, is used. To enable the circular knitting machine to knit a two layer structure with a non-knitting filling material, several adjustments was made on the machine. The adjustments concerned increasing the distance between the needle beds and lowering the knitting system thread guides to allow the filling material to be lead into the textile structure without interfering with the needles. The loop size and the yarn speed were adjusted individually depending on the task of the knitting system.

Achieving the Air Encapsulation

To enable the composite to contract in width and expand in the length of the yarn, a yarn with the ability to contract must be incorporated into the composite. The idea here is to take advantage of the shrinkage property, which most often is regarded as unwanted. Three materials were tested regarding their ability to contract the composite.

The materials were incorporated into the structure in the knitting process and constituted 50% of the back layer of the composite. The materials tested were Lycra/Elastan, wool (40/2) and Merinol. Lycra/Elastan is a yarn with a low melt content that results in a stiffening of the textile surface at the finishing stage.
The aim of the experiment was to see which material that would add the most to the composite's thermal insulation and at the same time stabilise the composite. Lyca is knitted into the structure in an elongated state. When it relaxes from the tension, it will pull together the rest of the structure in width, and since the composite has no physical restrictions in height, it will expand in that direction, resulting in a thickening of the composite.

**After-treatment**
Application of heat can be done in different ways, here we used two methods. Experiments were made to evaluate the difference between: a) applying heat through puffing steam from an iron, b) heat treatment with steam, c) after-treatment washing, at 60° followed by hang drying. Washing thus removes the stretch from the composite.

**Application of heat**
Consequently the thermal insulation capacity was doubled. The result of the experiments (fig 4) indicates that the washing treatment resulted in the highest degree of contraction in width and the best expansion (fig 5, fig 6) in height. Of the three materials, Pemotex shows the most significant properties in this respect, increasing in height by approximately 100%. Consequently the thermal insulation capacity was doubled.

**Cutting and Assembling**
The raw material from the knitting machine was cut along the pattern, which is formed by the interconnecting knitting loops. The tight position of the interconnecting knitting loops allowed for the material to be divided without exposing the filling material. Appropriate for this product would be to punch out the pattern parts with a continuous and heated punching-machine. Since the fibres used in the footwear system are synthetic, the heat from the punch-machine would melt the edges, forming a closed textile edge. This would be desirable in the assembling process, avoiding the filling material from the composite to entangle and cause problems in the assembling process. Two methods in assembling the footwear were tested, before and after the heat treatment. Finally the former was chosen, since it resulted in a more satisfying shape. The product is shown in fig 7.

**Conclusions**
The tangible result of the project is a three layered footwear concept, of which the thermally insulating middle layer was developed and produced on a circular knitting machine. The subdivision of the footwear into three separate and detachable functional layers enables it to meet the requirements of thermal comfort. To achieve and maintain thermophysiological comfort the footwear system needs to be convertible, to suit and shift the wearer's environmental conditions and levels of activity. Adopting the idea of the three layer principle, the footwear concept uses the technique of adding and excluding functional units, and thereby fulfills the requirements of flexibility. In line with the sustainability requirement the footwear's 3D shape (pattern) is designed to utilise the material effectively in cutting, minimizing the amount of waste and optimizing the production process. Since the pattern of the footwear is visible as a knitted pattern on the textile, the pattern for cutting is an integrated part of the fabric, which makes the cutting process easier. All units of the footwear system origin from the same pattern. High availability is achieved by the possibility to mass-produce the 3D shape on a circular knitting machine. This is an example of a frequently occurring machine within the textile industry. By this an example of rethinking what kind of product that can be produced on a certain machine or in a certain plant is given.

Since the material for the middle layer was developed to expand in height after the production process, the technique enables production of thicker materials than what is actually possible to produce on the knitting machine used in this project.

**The cognitive result of the project is that it has been shown that existing production equipment can be re-used for new products, reaching new markets. By this, machinery can be given prolonged life time in a plant, avoiding the need for environmentally impact- ing investments. The concept of re-using is expanded not only to embrace physical objects and materials but (industrial) processes. We emphasise the importance of design in realizing sustainability. The immaterial design phase has large consequences for the material usage.**

In total we have given one concrete example for the company on how to earn both a higher sustainability profile for itself and win environmental benefits for the world by not buying another machine for mass-production of the same thing.

Naturally what we have presented is just one example using the philosophy of rethinking both choice of technology for a certain product and what is possible to do with a given assembly of machinery. The hope is that it will inspire further endeavour along these lines.

**Acknowledgement**
Tommy Martinsson, Swedish School of Textiles, is acknowledged for support during the development of the configuration on the circular knitting machine.
References


Ideas for Another Workwear

Daniel Larsson, The Swedish School of Textiles, University of Borås
daniel.l.larsson@gmail.com

Abstract
Earth’s current state demands new perspectives in many fields; political, private, global and local. This article examines sustainable functions within workwear and fashion. A design process is argued to be developed within a sustainable frame concerning the whole chain of ecological, sociocultural and economical factors. The two construction traditions of a. tailored: pattern pieces constructed next to the body, and b. empty space: simplified construction using squares and space between body and garment, are investigated and contrasted in order to find elements of sustainability within aesthetic. The article argues for a greater view upon what could be sustainable aesthetic, in forms and values. This is related to a construction of clothes which allows movement and durability. A proposal is finally given which contains three various shapes and constructions for workwear trousers.

Keywords: workwear, sustainability, aesthetic, ecological age, construction, Wabi-Sabi.

In the Brunel Lecture Series, Peter Head (2011) states that by the year of 2050 everyone of us will have 1.44 hectare land to be supported from. The ecological footprint today in Sweden is 5.9 hectare per capita (Globalis 2012). These two facts demands the need of a change. But what change? We need to be more efficient in govern natural capital, producing more with less and consume better and less (WWF 2012).

We need a culture shift. Not just an easy adaptation from conventional to organic which we often seems to be willing to do when possible: we still drive cars but biofuelled, we climate compensate when travelling by air plane, and we have the possibility to buy organic cotton t-shirts very cheap today, as an example an organic top costs only 10 Euro in H&M:s spring collection 2012 (H&M 2012). As already stated, we can’t keep up with our current consumption, organic or conventional, since we already today uses the resources of 1,5 planet and will use 2 planets by the year of 2030 if things won’t change to the better (WWF 2012). Thus, a culture shift could be seen as a needed movement into an ecological age, which is different from both the industrial as the former agricultural. A culture where 80-100% of all products need to be sustainably sourced (Head 2011), which argues for new ideas and proposals in every field there is: political, private, global, local and of course, one of many, in fashion.

The Great Hunt for Function
The function of cloth could be seen as manifold; primarily the practical - the shelter-, secondarily the aesthetic and the social. These functions seems often to be put aside in benefit for the market, a channel for buyer demands and opportunities for sellers to fulfil these demands. The sellers on the market, brands, create new demands or shift them towards their own products trough branding and advertising (Klein 2001). This could be seen as a shift in function: where clothes are more and more seen as business...
rather than the original functions as practical, aesthetic and social. The current trend of fast fashion is a clear example of meeting the demands of the consumer, while at the same time creating these demands, where “the goods have a short-life cycle measured in months or even weeks” (Larsson, Ogheden 2010). All these functions have to be considered when speaking in terms of sustainability, and that’s why only, for example, a conversion to organic cotton in production won’t make a garment sustainable if there is a lack of sustainability in the rest of the chain. If sustainability is seen as a framework, different functions are co-working in a hierarchic order, dependent upon and subordinated each other. For instance, as argued in fig 1, the ecological functions are co-working in a hierarchic order, dependent upon and subordinated each other. For instance, as argued in fig 1, the different functions of simple-living farmers. Patched and sown together pieces of home-spun hemp and rags of cotton is the foundation that shaped the outcome of these garments, an aesthetic built on aesthetics needs to be considered, rather than the original functions as practical, aesthetic and social.

Sustainable Aesthetic?
All artefacts has an aesthetic function which needs to be considered, where the practical function by itself is not enough from a holistic viewpoint. Natural fibres are a good example containing both a practical and an aesthetic function. The knowledge of rational and non-rational is merged together within the experience of nature. So, if the aesthetic is important and needs to be considered, how will aesthetic be sustainable? I argue that the key is to add values that is sustainable within the aesthetic frame. A great example is the Japanese aesthetic tradition of Wabi-Sabi, often described as the aesthetic of the imperfect (Fridh 2004).

Wabi really means ‘poverty’ or negatively, ‘not to be in the fashionable society of the time’. To be poor, that is, not to be dependent on things worldly- wealth, power and reputation- and yet to feel inwardly the presence of something of the highest value, above time and social positions, this is what essentially constitutes wabi. (Suzuki 1993)

Another example of the aesthetic of Wabi-Sabi is the conception of cleanliness which do differs from a traditional western view. In the novel, in praise of shadows, Tanizaki Junichiro states that it’s something unsanitary about Japanese aesthetic (2001), which marks a distinction between what is bacterially unclean and what is only unclean to the eye, a distinction we westerners often tend to miss out.

Fig 1: Proposal for a sustainable frame work.

To discuss these conceptions is of great importance, since the greatest energy costs of a garment is found within the period of consumer use. The carbon footprint of a load of laundry, washed at 60 degrees and dried in a combined washer-dryer is 3.3 kg CO2 (Berners-Lee, Clark 2010). All these functions are co-working in a hierarchic order, dependent upon and subordinated each other. For instance, as argued in fig 1, the different functions of simple-living farmers. Patched and sown together pieces of home-spun hemp and rags of cotton is the foundation that shaped the outcome of these garments, an aesthetic built on aesthetics needs to be considered, rather than the original functions as practical, aesthetic and social.

Material
To achieve the values of wabi-sabi the choice of material is of greatest importance. The material needs to be able to tell the fundamental subject which is vanity and non-sustainable is to simply reject the aesthetic values and create artefacts which only has a practical function. I argue that this will be a dead creation and therefore not sustainable. A greater option would be to shift our conception of beauty to values that fit better with a shift towards an ecological age. Fridh (2004) describes an alternative, rooted in the Zen tradition of Japan, named the fundamental subject, which is: Asymmetry, Simplicity, Naturalness, Subtle profundity, Freedom from being attached to anything and Stillness. Adding these values in the research of aesthetic could bring new inputs in the sustainable field. An old example is the boro-tradition found in Japan, a mix between the aesthetic of wabi-sabi and the conditions of simplifying farmers. Patched and sown together pieces of home-spun hemp and rags of cotton is the foundation that shaped the outcome of these garments, an aesthetic built on necessities and close attachment to the earth.

In order to develop an aesthetic with sustainable values it is good to understand the practical functions of the garment. This knowledge could lead to greater possibilities within the aesthetic.

Fig 2. 2012/0108 White cotton shirt, 6 2012/05/08 Same white cotton shirt worn every day for four months without washing. The shirt could be seen as dirty, but also as naturally dried.

Different Spaces upon Body

Fig. 3: Aesthetic for movement. Tailored and fit.

The Nordic Textile Journal
The foundation of Western aesthetic in clothes is a constructed design method where the relation between the body and the garment could be described as tailored. Pattern pieces are often constructed to follow the body in an upright standing position, where extra fabric is cut away. Here the cloth could easily be seen as a tool, a resource to create a garment, and not containing great values just by itself, which could be compared to traditions where every bit of the cloth is precious and therefore cuts are avoided as much as possible. The outcome of the latter way of making garments often results in an aesthetic, which can be described as empty space or negative space, were the space between the garment and the body is a vital part of the aesthetic.

To argue for sustainability in one shape rather than the other might tend to be a non-rational discussion, which indeed is an important aspect. Perhaps we can’t reason for an sustainable aesthetic with words, it might be beyond us, which is not the same as not important to examine, or rather, experience.

Construction for Movement
As argued above, in order to create a sustainable design process all functions has to work together in a sustainable way. Thus, the function of aesthetic has to correspond with the other functions, which in workwear primarily is the practical. The garment is expected to handle tougher conditions and not tear apart. This is often solved material wise, an example is the Swedish workwear company Blåkläder, which uses Cordura® fabric as reinforcement at selected areas where tearing often occurs (Blaklader 2012). What many manufacturers are missing is the availability of movement within the garment. When a garment doesn’t follow the movement of the body the fabric will be stressed which will decrease the durability. This issue is often examined and worked through when stressing the fabric while bending the knee, as shown in Fig 6.

Theoretically this can be explained that the body has several points which can be stretched when moving and bending parts of the body. When bending the knee the length of the knee will increase which a pair of trousers often doesn’t consider. For great freedom of movement the trousers has to consider all these factors in order to prevent tearing.

Trousers often tends to have a restriction of movement when, as in Fig 7 stretching the length of the measurement z, where the width between the thighs is to short. This can be solved with extra width as described in Fig 8.
Another interesting point is the constructions of a sleeve, which tends to differ in traditions. The western tradition of the suit jacket sleeve, entitled as tailored, gives the wearer a proper look but is at the same time not really paying attention to freedom of movement. It’s made for keeping your arms downwards to the body and not for movements upwards. This could be compared to the construction shown in Fig 9, where the standard position of the arm is straight out from the body, which gives availability of movement both downwards and upwards. The outdoor clothing company Arc’teryx is paying attention to this when as a foundation in their construction method of a sleeve considering the latter of the two traditions of construction. Their jackets could be seen as a synthesis between the tailored tradition and the empty space tradition. Tailored gives lighter garments while empty space gives more air and space, which is an important aspect for the durability and maintaining of the garment; as for example the need to wash because of sweat occurred when the garment has been lying to tight next to the skin might decrease. These issues is often tried to be solved material wise with breathable fabric, still that is only one solution and a diversity of solutions is to be seen as good, especially when breathable fabrics often tend to made out from oil and environmentally uncertain coatings, such as GORE-TEX® (Sveriges Natur 2006).

Proposals for Trousers
When the measured needs for movement is considered, the actual shape of the garment could be anything and everything: empty space, fit, trousers or skirt. This leads to an freedom of aesthetic which could be emphasized with previous argumentation of sustainable aesthetic. The role model nature does always fit form to function (Benyus 1998); still nature could claim to possess characteristics such as beauty. It challenges our perception of the term workwear. Perhaps workwear could and should be described as a garment with a sustainable practical function, developed for a special physical activity, whether it is a skirt or trousers doesn’t matter just as the volume of the garment could heavily differ. When the choice of material and the construction works together with the aesthetic in a sustainable framework it is possible to give a nuanced perspective upon the current issues of sustainability. Fig 10, 11 and 12 is to been seen as proposal to what this could be. It’s a skirt, and two different pairs of trousers.

The skirt, Fig 10, is made of organic hemp, constructed as a square considering different kind of movements. A waist belt is adjusting the size making the garment an one-size. It could be emphasized as an empty space garment with a very simple construction, still fully functional as workwear, yet not an ordinary one.

The trousers in Fig 11 is a translation of common western workwear trousers, yet constructed for greater movement abilities when walking/running and bending down. The material is sourced from military surplus towels and dip dyed in Indigo. Besides the environmentally friendly aspect of using second hand cloth, it also adds a history to the garment and a uniqueness only possible to achieve when using and maintaining the cloth for a long time.

The last trousers, Fig 12, is a blend between the empty space aesthetic and the tailored. The construction for movement is a fusion between western ideas of construction, as darts and smart pattern pieces, and the idea of empty space, using the advantage of great space in the garment. The trousers are coated with bee wax and candle left-overs, as a sustainable option in order to make the garment more tear-, rain- and wind-proof.
Conclusion
These proposals are to be seen as one of many alternatives to cover a holistic sustainable view. These ideas must be discussed not only in workwear but for fashion as well. I find it is fully possible to work with these questions from smaller companies to larger, even though locally linked and more hand-crafted ideas could be easier to implement. A good example is the idea of slow fashion, where the ideas expressed in this article could be implemented. What is important and now, is the strive for a culture shift.

References
Benedict & Gray, Alexia. (1700). The rule of the holy father Saint Benedict, translated into English. Printed at Douay: [s.n.]
Proactive Fashion Design for Sustainable Consumption

Kirsi Niinimäki
Aalto University, School of Arts, Design and Architecture, Design Research
kirsi.niinimaki@aalto.fi

Abstract
This article presents a study that investigates product satisfaction in the context of clothing. The paper furthermore presents suggestions on how this knowledge can be used to create proactive fashion design for sustainable consumption. One of the main challenges in today's consumer society is how to design products that encourage consumers to engage in more environmentally responsible behaviour, sustainable consumption. This paper opens the discussion on how to change current unsustainable consumption behaviour related to clothing through a visionary, far-sighted design approach. Designers can create future-oriented sustainable designs that can transform consumption patterns towards more sustainable ones. Design for sustainability can thus be a redirective practice that aims for sustainable consumption, and the ways in which fashion design can be a proactive process with this aim will be described. This article shows why emotional satisfaction and enhancing a product's quality and other intrinsic characteristics are most important when attempting to extend the product's lifetime. Furthermore, this paper shows that services can create an opportunity to extend the enjoyable use of a product and offer satisfaction to consumers in a sustainable manner.

Keywords: proactive design, sustainable design, sustainable consumption, emotional satisfaction, PSS.

Introduction
Products configure consumer needs and use patterns; hence, design can be said to be "practice-oriented", creating certain everyday practices and consumption behaviour (Shove et al. 2007, 134–136). Current industrial design and mass-manufacturing systems stimulate consumerism and the production of disposable products (Walker 2007, 51). Fast changing trends lead to consumers' unsustainable consumption behaviour. To create a new, sustainable balance between design, manufacturing and consumption, alternative ways to create products are required to drive more sustainable consumption behaviour. Therefore, designers should evaluate how each design decision affects a consumer's consumption patterns. Understood in this way, sustainable design can be a redirective or a proactive practice that aims for sustainable practices in consumption (Fry 2009, 53).

Higher production volumes and simultaneous growing consumption have caused an increase in material consumption (Throne-Holst et al. 2007). Ever-changing fashion trends, affordable product prices and low-quality products cause consumers to engage in unsustainable consumption behaviour, such as impulse purchases, overconsumption, short use time and premature disposal of products. The increase in the purchase...
The paper begins by presenting the satisfaction process in the field of clothing. It also identifies attributes of clothing satisfaction. The article then presents ways to use these elements in the design process and subsequently describes how a PSS approach can offer new experiences and emotional satisfaction to the consumer in a more sustainable way. In fact PSS strategies can postpone product disposal by extending the enjoyable use time of the product or by offering new experiences to the consumer, and PSS can thereby postpone the product’s psychological obsolescence.

Research Design
This study concentrates on the consumer perspective and is constructed on the basis of three online questionnaires. The study employs qualitative research methods and coding through open questions has been content analyzed. The questionnaire A was conducted in April 2009 in Finland. The link to the questionnaire was disseminated among design students at Helsinki Metropolia University of Applied Sciences and the University of Lapland. Furthermore the link was available to staff at the University of Art and Design Helsinki and at the following eco-fashion companies: Ettolinen Kukka, Virheilat Vaatteet (Green Clothes), and Kierrätystehdas (Recycling Factory). A total of 251 respondents represented the Finnish population. The second survey was directed to a new and ethically interested female respondents, the second survey also represented rather equally different age categories: 18–25 years old, 21.5% 26–35 years old, 20.7% 36–45 years old, 25.2% 46–55 years old, and 14.8% 56 years old.

In questionnaires B and C the attributes leading to satisfaction were explored through open questions. Moreover specific demographic information on which attributes lead to short-term use of garments and dissatisfaction was collected and analyzed. This consumer-centered knowledge has functioned as a basis for better understanding emotional satisfaction in the field of clothing and service. As described in the following section, as well as contributing to Tables 1 and 2.

Sustainable Satisfaction with Clothing
If current unsustainable consumption patterns are to be transformed into more sustainable ones, the ways in which design can participate is a pertinent question. As described earlier, clothing has a unique position within the consumption field. Consumers’ disconfirmation experience. Consumers have certain expectations of product performance related to being satisfied, and dissatisfaction results when the product performs worse than expected (i.e. disconfirmation). Consumers’ product expectations therefore create a frame of reference against which they judge products.

The level of satisfaction is determined by attributes connected to different use situations and the products’ symbolic meanings. For example, garments in an official work environment must meet certain expectations regarding social acceptance and codes in the expression of professional status. In the home environment, clothing provides a relaxed and soft, tactile feeling, and this perception varies according to clothing category. With sports clothing, important aspects are functionality in action and durability in heavy use. Moreover, a consumer’s own personal factors influence the evaluation frame of reference and satisfaction attributes important to each consumer.

According to Swan and Combs (1976), the performance of clothing can be separated into instrumental performance (physical properties) and expressive performance. Expressive performance is linked to a consumer’s psychological response obtained through the product’s symbolic meanings (e.g. quality expectations) must be satisfied first. Nevertheless, frame of reference and satisfaction attributes will not result in satisfaction. Therefore clothing must also meet consumers’ emotional needs if it is to deliver satisfaction (Swan and Combs 1976).

The set of attributes through which consumers evaluate products is limited and therefore possible product expectations are determinants leading to satisfaction whereas other attributes are related to dissatisfaction. A good performance according to attributes important to the consumer is the best way to ensure satisfaction.

Satisfaction with clothing is fundamentally connected to clothing quality. Often consumers take the quality and durability of clothing as self-evident, and when asked about these issues in questionnaires, they point out that appearance is more important than expected (i.e. disconfirmation) (Churchill & Surprenant 1982; Oliver 1980). Consumers’ product expectations therefore create a frame of reference against which they judge products.

The Nordic Textile Journal
The attributes that enable longevity in clothing are the following:

- Quality:
  - Durability: materials that are hard-wearing, can be washed and reused multiple times without degrading.
  - Durability in use: garments that maintain their shape and fit over time.
  - High manufacturing quality: high-quality craftsmanship and use of high-quality materials.

- Functionality:
  - Easy maintenance:
    - Suitability in the use situation: the design is practical and functional, making it easy to use.
    - Physiological and psychological suitability: the garment is comfortable and fits well, contributing to the wearer's well-being.

- Aesthetic attributes:
  - Beauty, style, colour, fit
  - Expressive beauty above average
  - Tactile experience
  - Comfortable materials

- Values:
  - Product's values have to meet consumer's personal values

Table 1: Attributes that enable longevity in clothing

<table>
<thead>
<tr>
<th>Quality</th>
<th>Functionality</th>
<th>Aesthetic attributes</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durability</td>
<td>Easy maintenance</td>
<td>Beauty, style, colour</td>
<td>Product's values have to meet consumer's</td>
</tr>
<tr>
<td>Durability in use</td>
<td>suitability in the use situation</td>
<td>colour, fit</td>
<td>personal values</td>
</tr>
<tr>
<td>High manufacturing quality</td>
<td>suitability in the use situation</td>
<td>fit</td>
<td></td>
</tr>
</tbody>
</table>

Not only quality, functionality and aesthetics are important attributes; the values behind the product are also important to consumer satisfaction. Clothing choices must connect strongly with the wearer's self-image, identity and values. Wang and Wallendorf (2006) have argued that consumers with high materialistic values seek novelty and evaluate their possessions more frequently than consumers with lower materialistic values. They also highlight that materialistic consumers have less appreciation for deeper person-product relationships that develop during longer use situations. Consumers' materialistic values may also connect to the wearer and a pleasant tactile experience during use. Consumers with lower materialistic values may have greater appreciation for the personal meanings attributable to the product that emerge during long-term use (Wang & Wallendorf 2006). Consumers with high environmental and ethical interests place high importance on being able to find environmental value behind a product. These consumers respect characteristics, uniqueness or values symbolised by a product.

The easiest way to offer product satisfaction is to increase the product's intrinsic quality and inform the consumer accordingly. However, the clothing satisfaction process is complex and not easy for a designer to control. Table 2 presents the temporal dimensions in clothing satisfaction, combining those elements that lead to dissatisfaction helps the designer to emerge or even create person-product attachments in the field of clothing. These are the elements that a designer should try to embed in design if s/he is aiming for proactive fashion, deep product satisfaction and extended use time of the products.

Table 2: Elements of proactive sustainable fashion design

<table>
<thead>
<tr>
<th>Meanings in the past</th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaningful memories</td>
<td>Good functionality</td>
<td>Continuing satisfaction with the product</td>
</tr>
<tr>
<td>Meaningful associations, which create person-product attachments</td>
<td>Aesthetical dimensions</td>
<td>Product or service fulfills consumer’s changing needs</td>
</tr>
<tr>
<td></td>
<td>Enjoyable experiences during use</td>
<td>New elements in design</td>
</tr>
<tr>
<td></td>
<td>High intrinsic quality</td>
<td>New experiences with the product</td>
</tr>
<tr>
<td></td>
<td>Product utility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection to self, identity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Product meets consumer's personal values</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wearer's own effort and achievement</td>
<td></td>
</tr>
</tbody>
</table>

The following section presents several design approaches to deeper person-product satisfaction in the field of clothing. With these design strategies the designer can aim to achieve proactive and sustainable design.
Fulfilling Consumers’ Changing Needs Through PSS

The PSS approach allows the creation of new experiences with the product, with consumers having a greater sense of control and satisfaction over the product’s lifetime. PSS strategies can help extend the life of a product or changes to a product to enable it to better suit a consumer’s changing needs.

Positioning products’ lifetimes is to achieve continuing satisfaction with the product. The PSS design creates the confidence that time, effort and money spent on a product or changes to a product can be used to better suit the consumer’s changing needs.

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.

Fulfilling Consumers’ Changing Needs Through PSS

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.

Fulfilling Consumers’ Changing Needs Through PSS

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.

Fulfilling Consumers’ Changing Needs Through PSS

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.

Fulfilling Consumers’ Changing Needs Through PSS

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.

Fulfilling Consumers’ Changing Needs Through PSS

High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use. High-quality products can be targeted for shared and intensive use.

For example, Patagonia has a recycling programme where the consumer can return old clothing to be made into new fibre material. Patagonia not only takes back its own products, old garments are also repaired and re-used. Consumers can send damaged garments to be recycled into new fibre material, but it is also possible to repair damaged garments voluntarily.

Giving consumers the power to create their own product or changes to a product to enable it to better suit a consumer’s changing needs.

The PSS approach allows the creation of new experiences with the product. Consumers are now able to define their own product meanings and satisfaction instead of simply products. PSS thinking as such allows for sustainable production and consumption.

Global Manufacturing + Local Services

Global Manufacturing + Local Services is designed to help consumers identify those values in the product that best meet her/his own value base, and long product lifetime. In sum, providing consumers with possibilities for quality garments allow for an extension of a product’s life span.
and offers new possibilities for changing the system. If sustainable development is a goal, it is necessary to find ways to slow consumption through sustainable design.

This study investigated product satisfaction in the context of clothing and this knowledge was used to understand and define proactive fashion design for sustainable consumption. It opened views into the process of consumer satisfaction. A main issue that arises when aiming to extend the life of garments is to increase their durability and intrinsic quality. Moreover, fulfilling consumers’ other expectations regarding the garment’s aesthetic and functional attributes is important to ensure product satisfaction. Finally the issue of value is most important with regard to deep product satisfaction: values associated with the product, the manufacturing process and behind the companies have to meet the consumers’ own value base so that the consumer feels completely satisfied with the product.

By identifying the reasons for the short and long-term use of clothing, it is possible to find new ways to create sustainable designs that can result in a reductive practice directed towards sustainable consumption. Proactive fashion design for sustainable consumption takes these reasons into account, thus enabling clothing longevity. Satisfying consumers’ expectations regarding quality, functionality, aesthetics and value is a key to extending the use time of a product. Moreover, the emotional side of consumption must be understood to provide more sustainable ways to ensure customer satisfaction.

The PSS approach provides an opportunity to extend the enjoyable use of a product and thus avoid psychological obsolescence and a garment’s premature disposal. Stimulating a sense of meaningful uniqueness and achievement through design services and a garment’s enjoyable use time.

Sustainable design can be a reductive or proactive practice that aims for sustainable consumption. We need visionary and far-sighted design approaches, empathic understanding of the consumer and his/her emotional needs, and a new kind of green business thinking to do things differently. Designers can create future-oriented sustainable designs that can transform consumption patterns towards more sustainable ones. This is especially important in the field of clothing and fashion.

The most promising sustainable design strategy is the combination of product design with service elements: PSS strategies are therefore a future path to proactive and sustainable design.

Sustainable design can also dematerialise consumption through sustainable design. It is possible to find new ways to create sustainable and offer new possibilities for changing the system. If sustainable development is a goal, it is necessary to find ways to slow consumption through sustainable design.

References
WEB references
Anna Ruhoshen: http://annaaruohonen.com
Belbamboo: http://www.belbamboo-shop.com/
Lastwear clothing company: http://www.lastwear.com
Nomodesign: http://nomodesign.com
Patagonia: http://www.patagonia.com
WEB references
Anna Ruhoshen: http://annaaruohonen.com
Belbamboo: http://www.belbamboo-shop.com/
Lastwear clothing company: http://www.lastwear.com
Nomodesign: http://nomodesign.com
Patagonia: http://www.patagonia.com
WEB references
Anna Ruhoshen: http://annaaruohonen.com
Belbamboo: http://www.belbamboo-shop.com/
Lastwear clothing company: http://www.lastwear.com
Nomodesign: http://nomodesign.com
Patagonia: http://www.patagonia.com
HeadCrowd: visual feedback for design

Britta Kalkreuter, David Robb
School of Textiles and Design, Heriot-Watt University
B.Kalkreuter@hw.ac.uk, dar14@hw.ac.uk

Abstract
HeadCrowd is a collaboration between the School of Mathematical and Computer Sciences and the School of Textiles and Design at Heriot-Watt University. It investigates how rich web and mobile applications may be employed to provide designers with near instantaneous and highly visual feedback from thousands of potential customers, or crowds. We are exploring the use of state of the art rich media applications to add quantity, speed and statistical accuracy to the study of semiotics, and the use of visuals in fashion as communication.

The project seeks to add to participatory design and market intelligence processes by enabling rapid and iterated co-design cycles between crowds and designers based on visual forms of communication so as to mirror the highly visual nature of fashion design inspiration. Such a scheme shows applications for sustainability in fashion if it can give crowds a concrete sense of ownership of the design process and provide enthusiastic target markets, thereby offering potential to significantly reduce the risks of producing unwanted product.

The paper provides an analysis of prior knowledge before describing the first two stages of the project, in which a pilot browser has been constructed that allows observers to navigate a vocabulary of 500 images which have been ordered into 48 similarity stacks using a mixture of human and crowd sourced sorting techniques. A first test involved the presentation of 20 terms to observers and asking them to choose 3 images from the browser to represent each term. Analysis of the resulting pilot data has given insights into the communicative certainty that a selection of 3 images from a vocabulary of 500 can provide for certain types of terms, and amongst certain groups of testers. It has also prompted deeper analysis of the pilot browser.

To put the communicative value of visual feedback to the test, the current research phase is preparing the reverse experiment of asking a fresh cohort of participants to associate images back to the original terms, and various interfaces are currently being constructed to facilitate the presentation of visual choices from phase 1. The similarity relationship between test images is investigated and visualized before a case is made for comparative experiments of raw selection data and versions of visual summaries in this second research phase, in order to test which way of data presentations best convey the intended visual communication.

Keywords: visual feedback, rich web applications, participatory design, sustainability
One aspect often mentioned alongside co-design is mass crowd which coalesces around their specific designs. Groups who may become aligned with specific designers. This more individualised consumption of media is an fragmentation into groups and their interests are becoming more circularly pertinent to the Head Crowd project is “De-massification”. Many of Toffler’s predictions (made from the trends he had was previously done for them in the production of a product consumer who has taken on some responsibilities of work that Co-design fits well with Toffler’s idea as the consumer in Head-Crowd: visual feedback for design. Current thinking in the areas of co-design, semiology and sustainable design solutions.

Co-design
Sanders & Westerlund (2008) also make the point that consideration previous design or co-design experience and their expectations. would be some function of the designer and the crowd’s cation tools for the designer and the crowd. The second aspect envisioned system these would equate, in the first case, to the any current ideas that they are working on, and the domain of practice of those taking part in the co-design activity along with physical space in which the activity happens, the experience and activity takes place, or the design space. Sanders & Westerlund (2008) makes the point that with content based image search, the Self Organising Map (SOM) browser is a good solution for a large set of monochrome images the Self Organising Map (SOM) browser is a good solution and significantly better than two other browsers. However, it can be argued that the work of this project seeks to establish a visual language for fast intuitive visual feedback. In that case a brief examination of some principles of linguistics and semiotics is appropriate.

Semiology and Communication
It can be argued that the work of this project seeks to establish a visual language for fast intuitive visual feedback. In that case a brief examination of some principles of linguistics and semiotics is appropriate.

Semiology is usually taken to be the study of signs and symbols. Chandler (2002) defines semiotics as “...the study... of anything which ‘stands for something else.’” When the web site summaries hundreds of such visual messages, will what the designer reads the message truly reflect what the crowd was trying to say?

Image Browsing
However visual communication is already often done with a Pictionary-like online game. A communication channel using text query in a system where images are labelled). However, the user may not always know how to formulate their query. They may need to provide as a visual image to hand or may need to provide adequate skills or tools to sketch out equally any keywords they come up with for use in a label-based system may be misleading (Tauber et al. 2003). People may not really know what they are looking for. In these circumstances allowing the user to browse an organised collection of images can allow them to find an image that fits their requirements however vague those requirements may be. Saussure, in his theory of language, as described by Culler (1976), argued that, in language, signs are an arbitrary combina- tion of signifier and signified. e.g. there is no natural reason for the word, dog, to signify what we recognise as the furry animal that barks. This raises the prospect of an involved and time-consuming language learning process to be gone through before visual communication can be realistically envisaged. However, the abstract image set it is hoped to capitalise on current visual conventions already within the experience of the crowd and the designer to allow communication both to take place initially and to develop. The work so far in the project has focussed on using abstract images to capture meaning. We have been unable to find any studies involving transmission of meaning using abstract images. However, visual card designers can correctly choose from a limited set of symbols. Signs without words at airports and on our roads are clear evidence that symbolic visual communication works. Otto Neurath (1933) even developed a language of pictures to be used in education. Indeed pictographic languages such Japanese use characters originally derived from stylised drawings. Hebecker & Ebert (2010) have investigated the development and recognisability of visual metaphors and designed a Pictionary-like online game. A communication channel using established sign languages or instructions could be a valid component of a visual feedback system.

Image Browsing
Heesch (2008) makes the point that with content based image retrieval a user is required to provide a query. The query can be an example image, a sketch (The users could then receive two separate streams of feedback and make design decisions accordingly.

HeadCrowd: visual feedback for design
HeadCrowd is a collaboration between the School of Mathematical and Computer Sciences and the School of Textiles and Design at Heriot-Watt University. It will employ rich web and mobile appli- cations to provide designers with near instantaneous and highly visual feedback from thousands of potential customers and collaborators, instead of waiting for developments of prototypes that will have added value to them, thus contributing to sustainable design solutions.

Visual prompts for designers are routinely used in commercial forecasting, and individual ambitions in fashion design are encouraged by a growing number of websites promising co-design, and while 2.0 and similar and subsequent platforms have opened these new possibilities of participation to designers, they are often not being realised due to the lack of representation of visual feedback. In contrast, the project envisioned by the designers and the crowd is expected to yield valuable decisions accordingly.

Co-design
Toffler posed the term “prosumer” (Toffler 1980) for a consumer who has taken on some responsibilities of work that was previously done for them in the production of a product. Sanders & Simons (2009) add that additional benefits may accrue from co-creation in the form of long term gains in brands and even events including improved quality of life and increased ecological sustainability.

A major factor in co-design is the context in which the co-design activity takes place, or the design space. Sanders & Westerlund (2011) describe this as encompassing three aspects: The actual objects and the environment in which they are consumed, the current practice of those taking part in the co-design activity along with any current ideas that they are working on, and the domain of practice of those practicing co-design and their expectations. Sanders & Westerlund also make the point that consideration should be given to how the co-design activity will be recorded and how that record will be communicated. It is hoped that the record of each co-design process in our proposed system will add value to an associated final product.

Crowds and Crowd-sourcing
For designers, the use of crowdsourcing, as described by Sanders recent projects gives a leader to the debate of co-design, and while 2.0 and similar and subsequent platforms have opened these new possibilities of participation to designers, they are often not being realised due to the lack of representation of visual feedback. In contrast, the project envisioned by the designers and the crowd is expected to yield valuable decisions accordingly.

Co-design
Toffler posed the term “prosumer” (Toffler 1980) for a consumer who has taken on some responsibilities of work that was previously done for them in the production of a product. Sanders & Simons (2009) add that additional benefits may accrue from co-creation in the form of long term gains in brands and even events including improved quality of life and increased ecological sustainability.

A major factor in co-design is the context in which the co-design activity takes place, or the design space. Sanders & Westerlund (2011) describe this as encompassing three aspects: The actual objects and the environment in which they are consumed, the current practice of those taking part in the co-design activity along with any current ideas that they are working on, and the domain of practice of those practicing co-design and their expectations. Sanders & Westerlund also make the point that consideration should be given to how the co-design activity will be recorded and how that record will be communicated. It is hoped that the record of each co-design process in our proposed system will add value to an associated final product.

Crowds and Crowd-sourcing
For designers, the use of crowdsourcing, as described by Sanders recent projects gives a leader to the debate of co-design, and while 2.0 and similar and subsequent platforms have opened these new possibilities of participation to designers, they are often not being realised due to the lack of representation of visual feedback. In contrast, the project envisioned by the designers and the crowd is expected to yield valuable decisions accordingly.

Co-design
Toffler posed the term “prosumer” (Toffler 1980) for a consumer who has taken on some responsibilities of work that was previously done for them in the production of a product. Sanders & Simons (2009) add that additional benefits may accrue from co-creation in the form of long term gains in brands and even events including improved quality of life and increased ecological sustainability.

A major factor in co-design is the context in which the co-design activity takes place, or the design space. Sanders & Westerlund (2011) describe this as encompassing three aspects: The actual objects and the environment in which they are consumed, the current practice of those taking part in the co-design activity along with any current ideas that they are working on, and the domain of practice of those practicing co-design and their expectations. Sanders & Westerlund also make the point that consideration should be given to how the co-design activity will be recorded and how that record will be communicated. It is hoped that the record of each co-design process in our proposed system will add value to an associated final product.

Crowds and Crowd-sourcing
For designers, the use of crowdsourcing, as described by Sanders recent projects gives a leader to the debate of co-design, and while 2.0 and similar and subsequent platforms have opened these new possibilities of participation to designers, they are often not being realised due to the lack of representation of visual feedback. In contrast, the project envisioned by the designers and the crowd is expected to yield valuable decisions accordingly.

Co-design
Toffler posed the term “prosumer” (Toffler 1980) for a consumer who has taken on some responsibilities of work that was previously done for them in the production of a product. Sanders & Simons (2009) add that additional benefits may accrue from co-creation in the form of long term gains in brands and even events including improved quality of life and increased ecological sustainability.

A major factor in co-design is the context in which the co-design activity takes place, or the design space. Sanders & Westerlund (2011) describe this as encompassing three aspects: The actual objects and the environment in which they are consumed, the current practice of those taking part in the co-design activity along with any current ideas that they are working on, and the domain of practice of those practicing co-design and their expectations. Sanders & Westerlund also make the point that consideration should be given to how the co-design activity will be recorded and how that record will be communicated. It is hoped that the record of each co-design process in our proposed system will add value to an associated final product.

Crowds and Crowd-sourcing
For designers, the use of crowdsourcing, as described by Sanders recent projects gives a leader to the debate of co-design, and while 2.0 and similar and subsequent platforms have opened these new possibilities of participation to designers, they are often not being realised due to the lack of representation of visual feedback. In contrast, the project envisioned by the designers and the crowd is expected to yield valuable decisions accordingly.

Co-design
Toffler posed the term “prosumer” (Toffler 1980) for a consumer who has taken on some responsibilities of work that was previously done for them in the production of a product. Sanders & Simons (2009) add that additional benefits may accrue from co-creation in the form of long term gains in brands and even events including improved quality of life and increased ecological sustainability.

A major factor in co-design is the context in which the co-design activity takes place, or the design space. Sanders & Westerlund (2011) describe this as encompassing three aspects: The actual objects and the environment in which they are consumed, the current practice of those taking part in the co-design activity along with any current ideas that they are working on, and the domain of practice of those practicing co-design and their expectations. Sanders & Westerlund also make the point that consideration should be given to how the co-design activity will be recorded and how that record will be communicated. It is hoped that the record of each co-design process in our proposed system will add value to an associated final product.
Visuals to Words

Taking into account what we already know about visual feedback, HeadCrowd considers design feedback capabilities of images in their own right, but uses the written word in experiments to verify what feedback was intended and picked up by giver and recipient of that message respectively. To minimize the predetermination of visual choice, the project uses a large image set, thus allowing for as free a selection as possible, and asks feedback givers to select three out of 500 visuals for each term described.

The first technical phase of the research concentrated on shaping prototype interfaces that allow fast and intuitive navigation of big numbers of visuals to facilitate selection by crowds; this essentially meant developing algorithms and protocols which automate the organization of large rich data sets. Easy navigation of these data sets was key to obtaining results that are relatively unaffected by fatigue, and our current work has made use of research on perceptually relevant image browsing by Halley and Holen (2012). Their Open Source Organising Map (SOM) browser was more effective than other ways of organising images to allow retrieval of a given image.

Visuals

In order to arrive at an appropriately large and varied image set, the first 1800 images tagged as abstract were screen scraped from Flickr.com account holders who make their images available with a Creative Commons licence. Although only images tagged as abstract were used, a large number of miss-tagged images had to be discarded manually as they included images of people, full conventional depictions of objects and writing.

Duplicates were excluded by a process of screening the image pixel data, which meant sorting the images by average red, green and blue pixel level and then displaying the images in order side-by-side in screens of multiple images. (One duplicate was found). Images which were very similar in composition to each other were eliminated to a large number of miss-tagged images had to be discarded manually as they included images of people, full conventional depictions of objects and writing.

The resulting similarity matrix for the initial 100 abstract images was then enlarged to a visual “vocabulary” of the desired size of 500 by a crowd sourcing augmentation process. Each MTurk observer is shown 20 of the 1800 images to allow retrieval of a given image.

Another realisation of the pilot data analysis was that a significant number of images made their way into the final 500-strong image set despite not actually following the project’s definition of abstract as they show people, full conventional depictions of objects or include writing or accepted symbols.

To eliminate the dangers of human fatigue while sorting, this nuclear, human sorted image set was then enlarged to a visual “vocabulary” of the desired size of 500 by a crowd sourcing process. Each MTurk observer is shown 20 of the 1800 images to allow retrieval of a given image.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Organising the images into Manageable Interfaces

While HeadCrowd seeks to employ computer technology whenever appropriate, it recognizes earlier research that indicates the importance of a human basis for such undertakings. The Self organizing Map (SOM) browser, as developed by Halley (2012), is effective because it is based on collected judgments of the observers about which images are similar. For a small number of images this can be done by having observers freely group the images into however many similarity groups they wish, and 20 observers organized the first 100 images of this project in this way. Each time a given image is grouped with another given image, that specific pairing of images is given a similarity score. Before the score is added up and then divided by the number of opportunities there were for that pairing to have occurred. The resulting similarity matrix for the initial 100 is 100 rows by 100 columns and can be used to categorise the images based on their perceived similarity.

To demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Organising the images into Manageable Interfaces

While HeadCrowd seeks to employ computer technology whenever appropriate, it recognizes earlier research that indicates the importance of a human basis for such undertakings. The Self organizing Map (SOM) browser, as developed by Halley (2012), is effective because it is based on collected judgments of the observers about which images are similar. For a small number of images this can be done by having observers freely group the images into however many similarity groups they wish, and 20 observers organized the first 100 images of this project in this way. Each time a given image is grouped with another given image, that specific pairing of images is given a similarity score. Before the score is added up and then divided by the number of opportunities there were for that pairing to have occurred. The resulting similarity matrix for the initial 100 is 100 rows by 100 columns and can be used to categorise the images based on their perceived similarity.

To demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Organising the images into Manageable Interfaces

While HeadCrowd seeks to employ computer technology whenever appropriate, it recognizes earlier research that indicates the importance of a human basis for such undertakings. The Self organizing Map (SOM) browser, as developed by Halley (2012), is effective because it is based on collected judgments of the observers about which images are similar. For a small number of images this can be done by having observers freely group the images into however many similarity groups they wish, and 20 observers organized the first 100 images of this project in this way. Each time a given image is grouped with another given image, that specific pairing of images is given a similarity score. Before the score is added up and then divided by the number of opportunities there were for that pairing to have occurred. The resulting similarity matrix for the initial 100 is 100 rows by 100 columns and can be used to categorise the images based on their perceived similarity.

To demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Organising the images into Manageable Interfaces

While HeadCrowd seeks to employ computer technology whenever appropriate, it recognizes earlier research that indicates the importance of a human basis for such undertakings. The Self organizing Map (SOM) browser, as developed by Halley (2012), is effective because it is based on collected judgments of the observers about which images are similar. For a small number of images this can be done by having observers freely group the images into however many similarity groups they wish, and 20 observers organized the first 100 images of this project in this way. Each time a given image is grouped with another given image, that specific pairing of images is given a similarity score. Before the score is added up and then divided by the number of opportunities there were for that pairing to have occurred. The resulting similarity matrix for the initial 100 is 100 rows by 100 columns and can be used to categorise the images based on their perceived similarity.

To demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Organising the images into Manageable Interfaces

While HeadCrowd seeks to employ computer technology whenever appropriate, it recognizes earlier research that indicates the importance of a human basis for such undertakings. The Self organizing Map (SOM) browser, as developed by Halley (2012), is effective because it is based on collected judgments of the observers about which images are similar. For a small number of images this can be done by having observers freely group the images into however many similarity groups they wish, and 20 observers organized the first 100 images of this project in this way. Each time a given image is grouped with another given image, that specific pairing of images is given a similarity score. Before the score is added up and then divided by the number of opportunities there were for that pairing to have occurred. The resulting similarity matrix for the initial 100 is 100 rows by 100 columns and can be used to categorise the images based on their perceived similarity.

To demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.

Again, this deviation from the originally intended selection criteria can partly be explained by human fatigue in the face of having to scrutinise such a large set of relatively small images, but it also calls for a tighter set of criteria for future image sets and further investigation of whether the margin for human error in privately tagged image collection makes them suitable for use in a controlled experiment.

However, while clearly a potential limitation of the current image set’s usefulness, we were able to use the existence of these non-abstract images in the pilot study to evaluate the varying efficacy of different image types for certain purposes, and certain groups of big numbers existing for selecting visuals. Selections for the terms “participation and interest” by the 20 pilot testers (see fig 2) for example demonstrate that descriptive images rather than truly abstract ones are popular when observers are asked to associate images with emotional and material terms in the visuals to word pilot.
The image on the top of a particular stack in the SOM browser is the image in the stack which is nearest the centred position of the perceptual similarity space represented by all the images in that stack. Once an observer clicks on one of the images on this top level, that centroid image, together with all images that were associated as similar (and have therefore been assigned to its stack) are shown on a screen for the observer to choose from. (See fig 5).

A detailed analysis of all pilot image choices will need to consider their position on the SOM browser as a possible determining factor for selection or non-selection by an observer. Already it emerges that although the 48 top level (6x8 iPad interface) images only make up less than 1/10 of the entire image set, their representation in final image choices is nearer 1/7, suggesting their prominent position has made them more likely to be chosen by observers. However, image position in the stacks and on the SOM browser interface is, of course, far from random as it correlates to the complex interrelationship of similarities that was assigned to images by initial hand sorting and MTurk augmentation:

Visualising similarities between images in stacks, and images in adjacent stacks through 3D MDS visualisation can be a highly navigable way to observe how images had been assigned to its stack) are shown on a screen for the observer to choose from. (See fig 5).

A highly navigable way to observe how images had been assigned to similarity stacks by hand sorting and MTurk augmentation is the image in the stack which is nearest the centred position of the perceptual similarity space represented by all the images in that stack. Once an observer clicks on one of the images on this top level, that centroid image, together with all images that were associated as similar (and have therefore been assigned to its stack) are shown on a screen for the observer to choose from. (See fig 5).

Communicating Visually

With the aim of discovering whether meaning can be reliably communicated between participants of different backgrounds using a fixed set of images we are conducting a selection experiment in two phases:

**Phase 1 Visual to Word Pilot**

Phase 1 of the pilot has already been completed and involved the presentation of 20 terms to 20 observers, asking them to choose 3 images from the SOM browser to represent each term. The terms comprised of 10 descriptive words sourced from non-experts as being descriptive of fabrics or products [Metheven et al 2011] and 10 emotional terms sourced from the “Geneva Emotional Wheel” [Scherer 2005]

20 Observers (10 male, 10 female, 10 designers, 10 non-designers from mixed (European and Asian) backgrounds in the 20–30 year age bracket) were shown the 10 descriptive terms followed by the 10 emotional terms in a random order and chose 3 different images from the SOM to represent each given term. The experiment was presented to the observers on an iPad, and their responses were recorded on a central server, making data collection and analysis easy, for almost any size of future sample. Analysis concentrated on criteria and research questions based on semantic and sociological questions surrounding the image set and selection behaviour of the distinct observer groups in the pilot:

**Quantitative evaluation of the pilot data, namely considering the frequency with which a particular visual was chosen by more than one observer to describe the same term, was identified as a key measure for assessing how fixed (and strong) the communication value of an image is amongst respondents. Some interesting general trends emerged as well as some specific ones when filtering image choices by specific groups, and for specific terms:**

Regardless of this result according to the Saussurian concept of signifier and signified means that observer's in the majority disagreed about the visual signifier for a given signified, in other words, the result indicates the image set's relatively low certainty of communicative value and may be seen to confirm that a lack of codification in visuals renders them a less suitable or certainly less unambiguous tool for imparting intelligible feedback than language, and should therefore be avoided. However, Head’s methodology is aimed at developing tools for a design discipline that works on highly visual inspiration rather than relying on textual description, and looking at the pilot data in more detail and according to certain search criteria, allows an interesting qualification of the rather negative first impression on communicative value of visual feedback.

When considering all of the 20 observers’ choices separately by type of term, it emerged that singular choices, seen above as an indicator for low communicative certainty of an image, accounted on average for 69.50% of selections for the emotional terms but for just 55.33% of images when observers had been asked to describe textual terms.

While fashion undoubtedly consists of a whole lot more than cloth stitched into shape, it means that the terms that are arguably more immediately meaningful to fashion design found more agreement across 20 observers on which image might represent them. In fact it seems somewhat remarkable that almost half of the image choices for textual terms were agreed on by at least two of 20 individual observers, each faced with choosing just 3 per term from a bank of 500. Despite these results, emotive terms cannot be discarded in this study of visual feedback for design as they are frequently present in aforementioned forecasting and mood boards alike. The conclusion we must draw from this part of the pilot evaluation is however that particular care must be taken when eliciting and evaluating feedback on these more ephemeral aspects of design.

Even less agreement on the most appropriate visual signifier of a given term can be detected when looking at the pilot data from certain social groups’ (or distinct crowds’) point of view:

**Sorting the choices by gender, males top the list of disagreeing by choosing on average 79.17% of images just once while**
females display just 74.33% of singular choices. Looking at the pilot data according to professional background, designers and non-designers interestingly do not on average display a less or more unambiguous attitude to using visual signifiers (as might have been expected given different work practices as regards visuals) as both groups share an identical 77.17% of singular image choices.

Looking at the pilot data in detail rather than by averages confirms some of the above described trends; e.g. when “solid” scores the lowest percentage for singular choices (i.e. the highest level of agreed communication) across all 20 observers with just 40%, while “involvement/interest” scores 100% of individual choices, meaning total disagreement of communication value. Detailed scrutiny of the pilot results also shows some startling deviations from the norm as females score just 50% of singular choices on “tenderness and love”, showing an unusually high level of choice overlap for an emotional term, while 93.33% of designers’ choices for “delicate” are not matched by any fellow professionals, though material terms generally generated more agreement. Minute scrutiny of the results will continue to identify all factors that may have had a significant influence on choices. Amongst these is the way in which the 500 images were presented on the iPad interface:

Is the number of images in the full set proportionate to the choices allowed each observer, i.e. can observers easily handle 500 images?

Do observers of a certain background (female, male, designer, non-designer) favour certain types of images to communicate specific things? A thorough analysis of mood boards and fore-

Visual summaries of the image selections

As the semiotically motivated analysis of the pilot continues, HeadCrowd’s premise to use visuals as suggestive parts of a cumulative whole (the visual aggregation) is being researched in terms of a computer’s capability of calculating and representing what such a collage of image choices might look like, when informed by a set of collected human judgements about image similarity. A pilot aggregation of the 60 image selections per term according to a raft of popularity and similarity factors has now been designed to be used to facilitate the reverse experiment of eliciting term selections in response to images, or as Saussure would say, selecting a signified to the signifiers presented.

Visualisations of the responses in phase 1

The responses were visualised in two ways: All the chosen images for a given term were displayed simply in order of image ID number. Images that were chosen more than once were displayed multiple times to indicate this. (See Fig 1 and 2)

The images chosen for each term were displayed in 3D similarity space with the size (area) of each image being increased proportionately to signify its popularity. (See Fig 9).

Visual summaries of the image selections

As the eventual volume of image feedback selections by an internet crowd is envisioned to be very large, unmanageable in fact for visual feedback, a way of summarising the selections was needed as an alternative to simply listing the images. To this end a cluster analysis was carried out on the chosen images based on their similarity data. The responses were divided into 10 clusters. The image nearest to a cluster’s centroid in the similarity space was chosen to represent that cluster in a summary collage which will then consist of just 10 images of size depending on each cluster’s popularity. The position of the images is determined by their position in the similarity space, projected into two dimensions. (See fig 10)

The next phase of the pilot will be a comparative study showing the raw (60 image) selections and their automated summary collages to a fresh set of observers in random order, asking them to indicate which of the 20 terms they think the given view conveys using mass selections from large image set. Showing raw selection data and an aggregated summary separately to the same observers will indicate whether summary collages are more or less effective than full sets of image selections at conveying meaning, with potentially wide ranging consequences for the usability of crowd-sourced visual feedback for design.
References


Culler, J. (1976). Saussure, Fontana


Value Innovation and Demand Chain Management – keys to future success in the fashion industry

Dag Ericsson
School of Engineering, University of Borås and Swedish Institute for Innovative Retailing (SIIR)
dag.ericsson@hb.se

Malin Sundström
School of Business and IT, University of Borås and Swedish Institute for Innovative Retailing (SIIR)
malin.sundstrom@hb.se

Abstract
Value innovation is a key in developing competitive advantage in most industries. Value innovation is both related to the physical products and accompanying value-adding services. Logistics has evolved from an order qualifier – that is a necessity – to an order winner. Increased focus on the consumer and co-creation with the consumer as a vital partner lead to alignments and rethinking of the channel structure. The supply chain evolves into a demand chain! Deeper knowledge about the why, how, and when of consumer buying behaviour is a main ingredient in demand chain thinking, and the starting point in designing and developing segmented demand chains in the fashion market. These chains are built on partnership and trust oriented relationships. The game of power is increasingly replaced by the game of trust. This is a necessity when the competition shifts from rivalry between companies to rivalry between chains. In this position paper we discuss visions of the fashion future, and how to develop innovative concepts that deliver added value to the consumer. The “old school” of distribution economy, and the concept of convenience, are the basic theoretical grounds, and we argue that innovations could be reached when investing in consumer insights and closer relationships in the demand chain.

Keywords: added value, distribution economy, demand chain management, demand networks, convenience, consumer behaviour

Introduction
The fashion industry is in an interesting and challenging development. Some of the fashion companies have even served as archetypes for development of new business models in the Fast Moving Consumer Goods (FMCG) market. The industry is an interesting field also for the evolving business models based on closer integration between logistics and marketing, especially in terms of consumer and consumption processes. In Sweden, the fashion industry is facing a decline (Svensk Handel 2012). Many fashion customers begin expressing a feeling of “saturation” and search for other kinds of added value than just another garment to buy and wear. We see a clear change in the contemporary fashion market. On one side, competition is increasing on almost
all markets around the world. On the other side, globalization and new tools and techniques for transportation and physical distribution make it possible to build new and more efficient distribution channels. And from a consumer perspective, communication technology, such as the use of smart phones and applications, have become a natural part of everyday life. The nature of business has been transformed by the rise of new, creative business models, organization structures and behavior, a better understanding of the customer and perceived value, and, above all, a change of mindset (Ericsson 2011a). Change of mindset is the most difficult thing because it requires unlearning, i.e. getting rid of the old ways of thinking and replacing it with new paradigms. It is easy to put up new fancy strategies and goals, but very hard to implement them (Ericsson 2011b). Unlearning is at least 10 times as hard as learning! Therefore, change management has to be a major part of all efforts to improve effectiveness and efficiency in individual firms as well as supply chains.

The overall aim of this paper is to try and see how bits and pieces fit together to create a new pattern and understanding of the complex structure in the field of fashion and retailing. In order to distinguish between fads and lasting, innovative concepts, one must understand what kind of methods and tools to use, and how training and education should be performed in order to prepare the mind and design the transition to a new vision and innovation. One important tool in this development is to go back in time and retrieve the ideas from the “old school” distribution and demand fulfillment perspectives. ICT tools and techniques for transportation and physical distribution make it possible to build new and more efficient distribution channels. In retailing, an innovation has to be based on the consumer and “perceived value” as the starting point for value creation and innovation. There is a shift from the traditional functional (silo) orientation in the companies to a process oriented flow approach, which could be a starting point to change. Achievements in the supply chain have to move from a transactional to an advisory behaviour towards the customer, reuniting marketing and logistics. The necessity of an interdisciplinary and inter-functional approach to added value. The increasing focus on the consumer and “perceived value” as the starting point for design and development of segmented distribution highlights the need for a more customer-oriented and inter-functional approach to value creation and innovation.

The evolution of new business models in the fashion industry

The necessity of moving from a supplier oriented push approach, to a consumer oriented pull approach, is one of the mantra in today’s research and business literature (Darling et al. 2009). The quest for the fashion industry to understand and deliver demand, value is closely connected to the change and opportunities and they lead to an interesting challenge for the fashion industry. Value innovation is the key word for winning the future battle of consumers.

But innovation requires more than novel use of techniques and awareness of what is new. It requires change of business model, change of mindset, change of the customer and perceived value, and, above all, a change of business models, organization structures and behavior, a better understanding of the customer and perceived value, and, above all, a change of mindset (Ericsson 2011a). Change of mindset is the most difficult thing because it requires unlearning, i.e. getting rid of the old ways of thinking and replacing it with new paradigms. It is easy to put up new fancy strategies and goals, but very hard to implement them (Ericsson 2011b). Unlearning is at least 10 times as hard as learning! Therefore, change management has to be a major part of all efforts to improve effectiveness and efficiency in individual firms as well as supply chains.

The “old school”
The overall aim of this paper is to try and see how bits and pieces fit together to create a new pattern and understanding of the complex structure in the field of fashion and retailing. In order to distinguish between fads and lasting, innovative concepts, one must understand what kind of methods and tools to use, and how training and education should be performed in order to prepare the mind and design the transition to a new vision and innovation. One important tool in this development is to go back in time and retrieve the ideas from the “old school” distribution and demand fulfillment perspectives. ICT tools and techniques for transportation and physical distribution make it possible to build new and more efficient distribution channels. In retailing, an innovation has to be based on the consumer and “perceived value” as the starting point for value creation and innovation. There is a shift from the traditional functional (silo) orientation in the companies to a process oriented flow approach, which could be a starting point to change. Achievements in the supply chain have to move from a transactional to an advisory behaviour towards the customer, reuniting marketing and logistics. The necessity of an interdisciplinary and inter-functional approach to added value. The increasing focus on the consumer and “perceived value” as the starting point for design and development of segmented distribution highlights the need for a more customer-oriented and inter-functional approach to value creation and innovation.

The term information can be reinterpreted to stand for the “one-way street” and therefore it is better to talk about communication, replacing the power game with a two-way street. Communication is the tool to involve the consumer in the system and to get a real understanding of the buying and consumption processes. According to The Nordic Textile Journal, ICT and communication opens new and challenging possibilities for redefining the role of the customer and the necessary expertise to create and spread the message, it involves the sciences of media, management, logistics and technology” (editors 2010, p. 2).

The physical flow in fashion retailing today is accompanied by an integrated flow of information and services that increase the value of the product to the consumer. Hence, the strict boundaries between the flows are blurring which has to be taken into account when designing the offer to the consumer, the “value package”. The value package consists of the “hard core” which can be evaluated quality-wise in terms of traditional “according to specification” measures. The core is surrounded by several layers of added value. The first layer consists of “order qualifiers”, services necessary to permit the company to enter the “play-ground”, such as lead time, availability etc. The second layer consists of more intangible services that serve as order winners, such as attitudes toward consumers. (Ericsson 2011a). Both layers are judged by the consumer, and in many cases, the consumer is not aware that he/she is receiving the service or even that it is successful or failure. When evaluating a purchase, consumers often value a convenient purchase, meaning: easy to pay, a variety of payment methods etc. But a major part of all efforts to improve effectiveness and efficiency in individual firms as well as supply chains.

The quest for the fashion industry to understand and deliver demand, value is closely connected to the change and opportunities and they lead to an interesting challenge for the fashion industry. Value innovation is the key word for winning the future battle of consumers.

But innovation requires more than novel use of techniques and awareness of what is new. It requires change of business model, change of mindset, change of the customer and perceived value, and, above all, a change of business models, organization structures and behavior, a better understanding of the customer and perceived value, and, above all, a change of mindset (Ericsson 2011a). Change of mindset is the most difficult thing because it requires unlearning, i.e. getting rid of the old ways of thinking and replacing it with new paradigms. It is easy to put up new fancy strategies and goals, but very hard to implement them (Ericsson 2011b). Unlearning is at least 10 times as hard as learning! Therefore, change management has to be a major part of all efforts to improve effectiveness and efficiency in individual firms as well as supply chains.

The overall aim of this paper is to try and see how bits and pieces fit together to create a new pattern and understanding of the complex structure in the field of fashion and retailing. In order to distinguish between fads and lasting, innovative concepts, one must understand what kind of methods and tools to use, and how training and education should be performed in order to prepare the mind and design the transition to a new vision and innovation. One important tool in this development is to go back in time and retrieve the ideas from the “old school” distribution and demand fulfillment perspectives. ICT tools and techniques for transportation and physical distribution make it possible to build new and more efficient distribution channels. In retailing, an innovation has to be based on the consumer and “perceived value” as the starting point for value creation and innovation. There is a shift from the traditional functional (silo) orientation in the companies to a process oriented flow approach, which could be a starting point to change. Achievements in the supply chain have to move from a transactional to an advisory behaviour towards the customer, reuniting marketing and logistics. The necessity of an interdisciplinary and inter-functional approach to added value. The increasing focus on the consumer and “perceived value” as the starting point for design and development of segmented distribution highlights the need for a more customer-oriented and inter-functional approach to value creation and innovation.

The term information can be reinterpreted to stand for the “one-way street” and therefore it is better to talk about communication, replacing the power game with a two-way street. Communication is the tool to involve the consumer in the system and to get a real understanding of the buying and consumption processes. According to The Nordic Textile Journal, ICT and communication opens new and challenging possibilities for redefining the role of the customer and the necessary expertise to create and spread the message, it involves the sciences of media, management, logistics and technology” (editors 2010, p. 2).
A Holistic Approach and Reunion of Disciplines

When the discussion starts to separate apart during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that sold has to be replenished. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remember the story about the fashion brand that during the 50s a lack of mutual understanding started to evolve both in academia and in business. Today’s turbulent and highly volatile market, especially in the field of fashion, requires a reunion both in academia and in business.

The same type of holistic approach is necessary also within the fashion industry. There is no value in the products until they get a grip of missed sales as a consequence of stock outs and overstocking. We all remembers
Another channel relates to apparel classics such as white shirts, polos, T-shirts, underwear that can be replaced rather automatically on a never out of stock approach. Quick decisions are taken by responsible buyers based on sales and stock data. Seasonal swings and also changes in color and styles have to be taken into account.

At the other extreme are very fashionable short-season items for which there are no replacements at all. Very close cooperation with manufacturers is necessary to take advantage of volatility and to adapt products to desired changes in color, size, and shape. Seamless cooperation between retail and manufacturing can lead to added profits on the basis of successful products. Rapid response and short lead times are needed which means that manufacturing has to be closer to the market.

Conclusions
In this article it has been argued that added value in the field of fashion could be reached by integrating the “old school” of distribution economy and concurrent knowledge regarding convenience into a holistic approach of demand chain management. Innovations and prospering success could be reached when investment by building virtual networks and closer relationships in the demand chain. Fashion industry need to be more flexible and prepared to segment, not only different channels, but also within the same channel, adapting to smaller customer segments need of convenience as an added value. Our firm belief is that a weak expansion in most cases can be explained by a low investment in consumer knowledge and lack of adjustments according to different segments.

On a larger scale there is the problem of too much uniformity between all kinds of shopping centres and malls, which all look precisely the same, as a consequence of scale economies of large fashion and how to the internal control systems they have established. Apparently, this trend has not been reversed by the multiplication of small brand corporations (Jacobs 2004). And finally, even the most advanced form of cooperation between retailers and manufacturers won’t help in developing more radical fashion innovations, like the introduction of new products (e.g. mini- and maxi skirts, cat suits etc) or styles in the past. Room for genuinely creative thinking has to be opened up and stimulated in the organization.

One of the core ingredients in creating value is to analyze the value package as discussed above. Knowledge about the consumption process and the how, why and when of the actual purchase has to be turned into a picture, a visualization, of the value package. This image can be used as a target for design and development of the segmented supply chain with its accompanying information flows and relationships patterns (Ericsson 1996; 2011). In most cases, the physical products get more and more similar and also the first layer of services, the order qualifiers, are getting similar. What is important is to get the order winners right. They can turn the consumer experience from satisfaction to ecstasy!

References

Segmented Supply Chains
We need a portfolio of segmented supply chains based on categorization of products and customers with different requirements regarding where, when and how to shop and get deliveries. Systems for sourcing, replenishment, and ordering and returns management have to be established. This requires a higher degree of consumer intelligence and segmentation based on consumer buying behavior and consumption process.

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

In the fashion market, this leads to at least three different set ups:

One for traditional sourcing before the season. Fashion buyers and manufacturers with their own consumer insight may be very useful here (see eg. Fisher 1997).

Another is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!

The third option is the emergency situation when something unforeseen occurs such as a weak expansion or scheduled maintenance. In this case, a lean supply chain may be sufficient. The order winners might be strong enough to turn the consumer experience from satisfaction to ecstasy!


Sundström, M. (2007). De säger att nätbutik är bekvämt. [Engl. They say the online store is convenient], Diss., University of Gothenburg, School of Business, Economics and Law, Sweden.


In November 2011 the scientific conference Ambience’11 was successfully held in Borås. This was the third conference in the Ambience series and the second one in Borås. The theme of the conference was the intersections and interfaces between technology, art and design. With a foundation in artistic practice, the conference became a meeting place where art, design, architectural and technology communities came together to discuss and share ideas.

An exciting mix of scientists, artists, designers and innovators from all over the world came together in Borås to present their projects, exchange experiences and inspire one another, said Agneta Nordlund Andersson, Chair of Organizing Committee. She added that both during and after the conference new networks had been created which generated new contacts and interesting collaborations between the University of Borås and other participating universities and research institutes.

The visiting researcher presented their work both with paper presentations and with displays of objects in an exhibition at the Museum of Textile History. The curated exhibition added a new dimension to this scientific conference and was very well received by visiting guests, who could interact with many of the exhibited objects.

During the three day conference the 150 delegates experienced traditional Swedish food, an electronica concert, conference dinner at the City Hall in Borås, a dance performance produced by the Fashion Design PhD Student Ulrik-Martin Larsen and a nightly tour of the Swedish School of Textiles and its unique textile labs.

Find more information about the conference and download the conference proceedings and exhibition catalogue at www.ambience11.se.
Breath of Lights
Julia Bourel

Three modules of increasing size come out as a shell in hatching, showing the light in its nascent state. The envelope is made of ceramic remains fragility of a shell. Inside, a soft, silicone skin inflates as we intensify the brightness. A powered air increase the lamp to allow a slow propagation of light: the more it grows, the more the light intensifies.

A Source of Pleasure, or an Anxiety?
Axelle Beaujean

The question, or dilemma, of food sometimes dominates the routine of our daily lives. We must constantly make choices and compromises, taking into account both the dietary requirements and restrictions of our palate’s desires and what we assume our greatest needs to be. While we always need to know what we are really eating, the line is sometimes blurred between animals and plants. The bulk of our food comes from the food industry with many highly processed products. The endless list of colourings, flavourings, preservatives, texturizing agents and additives seems to weigh down on our perception of what is actually real. This culinary chemistry can be at times very disturbing, but it has become an important part of our food culture and daily intake, as time-poor eaters reach for a quick fix. The search for the quintessential food, that is, retaining only the cell and the molecule as the essence of taste, would work with the right mix of protein, fat, carbohydrates, a blend of suitable textures and the most refined tastes. By annihilating the form, this becomes a feasible design that would allow you to imagine something that no one has ever eaten before. Imagine that one day, in a normal everyday situation, we do not have the urge to consume any animals or vegetables. The ultimate objective is to “grow” food directly by limiting as much as possible the traditional stages of processing (breeding, butchering, packaging) in our meals. The science behind food design will be to grow the cells and to create cell tissue that is entirely edible, by anyone. The process of implanting cultured cells into food is so that they develop and give the food an edible touch. The idea is to produce sheets of material, whether animal or plant (as we do with the fabrication of synthetic skin) directly in their final packaging, allowing a shortcut between the final stages of traditional food production.

INTERACTIVITY

In November 2011 students of ENSAD Textile Design Department visited the conference at the University of Borås, AMBIENCE 11. INTERACTIVITY is a pedagogical project we developed after our visit. We asked the students to express themselves on this idea of interactivity, which is a keyword in the field of smart textiles. We selected six projects reflecting the links between textile design and technology to imagine states of materials.
Acoustic Blanket
Jennifer Hugot

The idea of this product is based on a three-dimensional honeycomb structure. It’s made of wool to isolate from noise and cold. Micro speakers would be integrated and connected into alveoli in order to provide an all-over acoustic pattern. You can plug your iPod into the blanket, stretch the textile to add volume or squeeze it close to you to lower the volume and keep the music only for your ears.

Dimensional Knitting
Clément Bottier

This project is an exploration in creating volume with knitting through thermoforming. Textile is not a field limited to surface design; it can be manipulated to become more dimensional and voluminous. The samples are made from polyethylene, knitted into cords, which are then knitted into dimensional shapes. The objects are melted in an oven, and then moulded into their rigid form. The material of the knit and how it is processed opens many possibilities. Given a stability and rigid three-dimensionality, knits can be used as materials for furniture, products, even architectures.
Light Memory
Maude Hannart

This project is based on the principle of photography at an architectural scale: a study about light’s movements and their capture on the wall. The research consists in developing a light-sensitive or photo-sensitive concrete. From the window lights, leaves marks on walls like a superposed photography. Surfaces become more and more bright, showing their trajectories, creating a relation to space and time.

Colorful Dialogue
Lola Mercier

Imagine a bar where the cozy atmosphere and the soft light would be conducive to privacy, meetings, and discussions. The glass top tables would be located in confined spaces. From the glass emerges an image of coloured shapes, light, and movements that evolve according to sound frequencies. Sound sensors integrated in the screen send information to a computer that converts them instantly into graphic images. From our conversations, the autonomous table comes to life and generates new trails of colours that blend and fuse with the effects of vibrations and undulations. In the colour variations, several hues, shades, and tonalities create a dialogue amongst each other.

There is a majority of bright colours and pastel colours that contrast with gray and bleached. The bright colours vibrate, bring light and wake up the cozy and lounge atmosphere of the bar. Indeed the coloured light that emanates from the table creates drop shadows and softly colours the room with progressive atmospheric lighting. The sound becomes visual, the trace of the noise or the word, if we listen to each other, spreads by images. We become spectators of our conversation and creator of an image always new. The louder the sound is the faster the shapes change, until the saturation results in hubbub of visual noise forms. These two parameters interact together. Moreover, one can come away with a recording image of our conversation as a digital file in a USB key.
From the Brundtland Report to the Global Organic Textile Standard

Elisabeth Tosti
Representative in Scandinavia,
International Working Group on Global Organic Textile Standard
tosti@global-standard.org

This article is an essay that outlines the political movement towards sustainability in the context of the development of the sustainable fashion industry today.

Keywords: Global Organic Textile Standard, The Brundtland report, political power, business civil society

Sustainability

In 1983 the General Secretary of United Nations asked Gro Harlem Brundtland, former Prime Minister in Norway, to serve as President of an independent Commission to report on the important challenges facing society globally. The main goal for the Commission was to recommend strategies to secure and enhance the environment of countries at different stages of social and economic development. These strategies should provide a realistic approach taking into account human needs, resource availability and environmental limits. The Commission finished their work in 1987 and the report is referred to as the “Brundtland report”.

In the report, sustainability is defined as:

“...fundamentally a process of changes in which exploitation of resources, rules for investments, developments in technology and institutional changes all are in a correlated balance and enforce the presence and future possibilities in responding the needs and hopes of the human beings.”

Since the release of the Brundtland report much has happened but the commitment of the Commission as well as between the Commission and civil and public society is one of the main reasons why the definition of sustainability in the Brundtland report is just as relevant as it was almost 30 years ago. It remains the official definition of sustainability to this day all over the world.

The United Nations Conference on Sustainable Development

In 1992 United Nations held the first Earth Summit in Rio. This summit represented the continuation of the Brundtland report. Some 178 countries signed up to Agenda 21 – a blueprint and a framework for a rethink of economic growth in the interest of social equity and to ensure environmental protection.

1 Brundtlandrapporten s. 7
2 Brundtlandrapporten s. 54
Of course there are several reasons why politicians highlight the organic food and cosmetic industry. One of the main reasons is that the organic farming and the cosmetic industry succeeded in telling the history of sustainability - again as a part of the journey to the good, sustainable and conscious life. In the area of the organic textile industry the story has still not been told in a way in which citizens take for granted the purchase of organic apparel. But the agenda is now moving forward.

The Fashion Industry in the Political Agenda

In connection with the Copenhagen Fashion Summit in May 2012, the Copenhagen Agreement was signed by stakeholders and decision makers from all over the world. The group’s task was to formulate strategies and policy options for governments to encourage sustainable fashion by:

- Providing an appropriate regulatory and economic framework for the fashion industry.
- Promoting trade and innovation that protects the environment and ensures respect for human rights and labour standards;
- Ensuring that consumers are provided with accurate information.

Once again we are making history. One hundred delegates from the conventional and the sustainable fashion industry were together with government officials from the EU-Commission and the UN. Decisive recommendations for the future of the sustainable fashion industry were presented.

Twenty years after the 1992 Earth Summit in Rio, the UN is again bringing together governments, international institutions and major groups including business to agree on a range of smart measures that can reduce poverty while promoting clean energy and a more sustainable and fair use of resources.

This year the fashion industry will join the Rio +20 Summit in June 2012.

The willingness for cooperation is not the result of a single event; many factors have come together to shape a new future for fashion.

From an environmental and ethical point of view we face a crisis. The conventional fashion industry is ranked as one of the most polluting industries in world. It is also an industry associated with very poor conditions for large numbers of workers throughout the supply chain.

From a normative point of view, sustainable fashion is in flux. In the 1980s and 1990s sustainable fashion was only a question of sustainability. Today most manufacturers of sustainable apparel are dealing with a range of important issues, such as quality, designs and price. But the sustainable fashion industry is essentially “slow fashion”, battling against conventional and unsustainable and often unethical thinking. Otherwise, the hand this situation is like the accepted view people have of sustainable fashion, which also includes recycling and second hand clothes. On the other hand, if the development of the Copenhagen Agreement is not accompanied by inadequate economic policies, the demand for sustainable fashion is inadequately developed and for this to change some of the largest manufacturers in the conventional industry will need to lead the way.

From an economic point of view conventional businesses are looking for new opportunities for generating income. The normative agenda influences the scope for new business possibilities and as a consequence of the economic crisis, conventional businesses are increasingly aware of the sustainable fashion sector as a new way of thinking. It is now smarter to throw your waste on the street.

For a political point of view, it is time to take action to safeguard the environment, specifically to minimize the combined risks to global security that climate change and population growth present to society.

The argument above reveals the classic distinction between the economic and political arena: the official technocratic system and the system of social and cultural behaviours expressed in people’s lives. In the official system the drive for sustainability is used as a tool achieve something beyond the immediate objective, to ensure social, economic and political stabilization. From a political point of view, it is time to take action to safeguard the environment, specifically to minimize the combined risks to global security that climate change and population growth present to society.

In the social and cultural world the purpose is to focus on our behaviour and on our own conditions. From this perspective, and in an ideal world, the artist can create art on their own terms and the designer can make designs that satisfy their own conditions, but we are and the world in such a world and many compromises are made between the professional technocratic system and the social and cultural world, simply to secure the survival of humanity.

Beside these conditions in managing political power, we are also facing the power of nature when talking about sustainability. This power has been ignored for hundreds of years by human society that defines itself as superior to nature. Now we are facing the end of nature’s patience and we have to cooperate with equal respect for nature before it is too late.

The eight recommendations from the Copenhagen Fashion Summit 2012 effectively respond to the issues outlined above, brought together in a way that only the fashion world can present.

1. Encouraging the integration of sustainable fashion curriculum into pre-school, primary, secondary, university and vocational education and training.
2. Supporting consumer engagement and behaviour change and campaign.
3. Promoting transparency, standards and accessibility of transparency product disclosure.
4. Enforcing guidelines for product communications and marketing to discourage and penalise green-washing.
5. Stimulating voluntary agreements with industry covering extended producer responsibility.
6. Providing economic incentives for generating sustainable fashion products and services.
7. Restricting harmful substances.
8. Developing a multi-stakeholder platform and provide funding. Implementing the recommendations provided in this document.

Writing this article in May 2012, it is too early to know what the political result will be when the European Climate Action Commissioner, Connie Hedegaard, presents the recommendations at the Rio+20 summit in June.

It is very important to monitor what actions are taking following the Rio+20 Summit in the context of an emerging political agenda. Taking the definition of sustainability in the Bruntland report into account, all eight recommendations are important for ensuring sustainable development throughout the whole of the fashion industry. As a concrete example of how it may be achieved, I will outline the ongoing efforts of ANANDI, which is a unique example of how to take action and be responsible for global welfare, to define and encourage human behaviour that is an integrated and integral part of securing a sustainable fashion future for nature and humankind.

How to Take Action – the story about Global Organic Textile Standard

In August 2002, people from all over the world met at the Intercot Conference in Düsseldorf in Germany, where a workshop was launched with representatives of organic cotton producers, the textile industry, consumers as well as standard...
Organic textiles will become a significant part of everyday life, and in 2005 the first version of the Global Organic Textile Standard (GOTS) was founded. Two years later in 2004 at InNaTex in Wallau the IWG signed an agreement with the aim to work towards harmonization of the various standards and to ensure the continued progress of the International Working Group on Global Organic Textile Standard (IWG) was founded.

Two years later in 2004 at IntTex in Wallau the IWG signed an agreement that defined the approach to establishing a common standard and in 2005 the first version of the Global Organic Textile Standard was released, followed in 2006 by the establishment of the IWG. Since 2006 nearly 3000 facilities all over the world have achieved GOTS certification. In line with the Bündnadel Report GOTS vision is to ensure that organic textiles will become a significant part of everyday life, enhancing people’s lives and securing a sustainable future for the environment.

GOTS mission is to develop, implement, verify, protect and promote the Global Organic Textile Standard (GOTS). This standard stipulates requirements throughout the supply chain for both energy and labour conditions in textile and apparel manufacturing, using organically produced raw materials. Organic production of fibres is based on a farming system that maintains and replenishes soil fertility without the use of toxic, persistent pesticides and fertilizers. In addition, organic production relies on an alternative welfare animal husbandry and excludes genetic modification. In developing GOTS, strict and binding requirements were established regarding ecological and social parameters. At the same time GOTS took into consideration the need for a standard specific for industries using organically produced fibres and appropriate to a wide range of products. Taking both aspects into account, GOTS defines organic textiles as being produced with the minimum possible environmental impact and with the lowest possible use of natural and synthetic chemical inputs that can leave residues.

GOTS is a dynamic standard that fosters constant progress towards development of better textile processing methods. In this continuous improvement process, GOTS collaborates with international experts by facilitating worldwide dialogue and supporting the development of innovative solutions for the improvement of the textile industry. In addition, GOTS collaborates with international experts by facilitating worldwide dialogue and supporting the development of innovative solutions for the improvement of the textile industry. GOTS is a dynamic standard that fosters constant progress towards development of better textile processing methods. In this continuous improvement process, GOTS collaborates with international experts by facilitating worldwide dialogue and supporting the development of innovative solutions for the improvement of the textile industry.

Harmonisation process

The Nordic countries the Governments rely on the Nordic Swan as the certification standard for organic textiles. But this seems not to be the opinion of the Swan in the future. On behalf of the Nordic EcoLabelling standards the Ecolabelling Office in Norway released a proposal in April 2012 where it is proposed that the Norwegian Swan is harmonized with the EU-label. As a consequence the standard will change from a requirement of organic raw materials of 100 percent to a requirement of just 10 percent. That will leave the Nordic market without a government approved organic standard for apparel, because the Customer Ombudsman in the Nordic Countries has stated that an organic product must contain a least 95 percent of organic raw-materials if it is to be sold as organic in the Nordic Countries with the recommendation that certification must be made by an independent third party. The decision taken by the Nordic Eco labeling offices would perhaps be understandable if it were justified by a lack of resources. However, the argument used is that there is a lack of organic cotton on the world market. From an economic point of view this is strange, because we all know that production depends on demand from the market. High demand because of high requirements will call for higher production.

In a period of approximately 50 years the textile industry has become more and more global and international competition in the textile industry is a fact. A manufacturer who would like to ensure survival cannot rely on either the home market or the Scandinavian market. At the same time several countries dominated by textile production do not have a legal infrastructure that can sufficiently ensure an objective and adequate quality test. Since the supervision of organic textile production must be performed to a high standard, it becomes risky if the certification of organic textiles depends on the national environmental legislation and possible accreditation-systems in every country. As mentioned above a standard is only as effective as it is credible. Therefore one of the keywords in the certification system of GOTS is that it is independently verified with one of the Nordic Swan relies on the countries’ own environmental legislation. However, the recently announced proposal and arguments being used suggest that the possibility for further collaboration in the future is insecure.

The Nordic countries rely on the Nordic Swan as the certification standard for organic textiles. But this seems not to be the opinion of the Swan in the future. On behalf of the Nordic EcoLabelling standards the Ecolabelling Office in Norway released a proposal in April 2012 where it is proposed that the Norwegian Swan is harmonized with the EU-label. As a consequence the standard will change from a requirement of organic raw materials of 100 percent to a requirement of just 10 percent. That will leave the Nordic market without a government approved organic standard for apparel, because the Customer Ombudsman in the Nordic Countries has stated that an organic product must contain a least 95 percent of organic raw-materials if it is to be sold as organic in the Nordic Countries with the recommendation that certification must be made by an independent third party. The decision taken by the Nordic Eco labeling offices would perhaps be understandable if it were justified by a lack of resources. However, the argument used is that there is a lack of organic cotton on the world market. From an economic point of view this is strange, because we all know that production depends on demand from the market. High demand because of high requirements will call for higher production.

In a period of approximately 50 years the textile industry has become more and more global and international competition in the textile industry is a fact. A manufacturer who would like to ensure survival cannot rely on either the home market or the Scandinavian market. At the same time several countries dominated by textile production do not have a legal infrastructure that can sufficiently ensure an objective and adequate quality test. Since the supervision of organic textile production must be performed to a high standard, it becomes risky if the certification of organic textiles depends on the national environmental legislation and possible accreditation-systems in every country. As mentioned above a standard is only as effective as it is credible. Therefore one of the keywords in the certification system of GOTS is that it is independently verified with one of the Nordic Swan relies on the countries’ own environmental legislation. However, the recently announced proposal and arguments being used suggest that the possibility for further collaboration in the future is insecure.

The Nordic countries rely on the Nordic Swan as the certification standard for organic textiles. But this seems not to be the opinion of the Swan in the future. On behalf of the Nordic EcoLabelling standards the Ecolabelling Office in Norway released a proposal in April 2012 where it is proposed that the Norwegian Swan is harmonized with the EU-label. As a consequence the standard will change from a requirement of organic raw materials of 100 percent to a requirement of just 10 percent. That will leave the Nordic market without a government approved organic standard for apparel, because the Customer Ombudsman in the Nordic Countries has stated that an organic product must contain a least 95 percent of organic raw-materials if it is to be sold as organic in the Nordic Countries with the recommendation that certification must be made by an independent third party. The decision taken by the Nordic Eco labeling offices would perhaps be understandable if it were justified by a lack of resources. However, the argument used is that there is a lack of organic cotton on the world market. From an economic point of view this is strange, because we all know that production depends on demand from the market. High demand because of high requirements will call for higher production.
Conclusion
For almost 30 years the discussion about how to secure a more sustainable world has been on political agenda at UN-level, at EU-level and at National Governmental level. The UN Sustainable Summit in 1992 had a major impact on shifting the direction of political thinking. Drop by drop the normative rules have influenced national governments and civil society alike.

As the former Secretary-General Kofi Annan announced: “It is the absence of broad-based business activity, not its presence that condemns humanity of suffering.”

It is time for business to take seriously their responsibility for the future of the next generation and it is possible to do this in a way which is not just smart, but also realistic from an economic point of view.

Taking the eight recommendations from the pre-meeting of The Copenhagen Fashion Summit we now have a framework for how the three-way partnership between governments, business and civil society can cooperate and work together to support a sustainable fashion industry in an exciting and modern way.

Political power can help to manage the demand for sustainable textiles and garments, for example when official institutions buy work clothes and uniforms. Already today almost 3000 businesses are ready to respond to the demand.

As a concrete step for a more visible and high profile position of GOTS towards civil society, GOTS entered the fashion scene by delivering the certification prize to the winner of the Nordic Fashion Association sustainable prize - a high-fashion designer.

By setting the standard that high fashion can be GOTS-certified GOTS clearly demonstrates that normative assumptions about the sustainable and good life will not be relegated to the ascetic way of life for latter-day Saints.

In line with that it will soon be smart to wear organic apparel among the fashion trend-setters. And the definition from the Brundtland report will be taken seriously in the fashion industry.

Dedication:
This article is dedicated to future generations, among them my two daughters Anne-Sofie and Katrine.

References
Nordic Initiative, Clean and Ethical (2012), document regarding actions to enable sustainable fashion consumption.
Acknowledgement: Thanks to Christopher Stopes, GOTS representative in the UK and Jacqueline Acatos at EcoS Consultancy for comments on this article.
The Nordic Textile Journal

The Editorial Board, The Nordic Textile Journal

Dennis Beach
Professor
University of Gothenburg, Sweden

Lena Berglin
Senior Lecturer
The Swedish School of Textiles
University of Borås, Sweden

Zane Berzina
Professor
Conceptual Development of Materials and Surfaces, Textile and Surface Design
The Art College Berlin-Weissensee, Germany

Sandy Black
Professor, Fashion and Textile Design and Technology, London College of Fashion, United Kingdom

Sass Brown
Resident Director
Fashion Institute of Technology, Italy

Lucy Daly
Research Business Manager
Manchester Business School
The University of Manchester, United Kingdom

Kate Fletcher
Reader, Sustainable Fashion
London College of Fashion, United Kingdom

Nancy de Freitas
Associate Professor, School of Art and Design
Auckland University of Technology, New Zealand

Lars Hallnäs
Professor, Interaction Design
The Swedish School of Textiles
University of Borås, Sweden

Hilde Haauan Johnsen
Professor
Bergen Academy of Art and Design, Norway

Vladan Koncar
Professor and Director, GEMTEX research laboratory
ENSAIT, France

Heikki Mattila
Professor, Textile Management
The Swedish School of Textiles
University of Borås, Sweden

Ann Merete Ohrt
Lecturer
School of Design, The Royal Danish Academy of Fine Arts, Denmark

Joel Peterson
PhD Student
The Swedish School of Textiles
University of Borås, Sweden

Mette Ramsgaard Thomsen
Professor, School of Architecture
The Royal Danish Academy of Fine Arts, Denmark

Vibeke Risberg
Associate Professor
Kolding School of Design, Denmark

Mika Satomi
Guest researcher, Smart Textile Design Lab
The Swedish School of Textiles
University of Borås, Sweden

Lisbeth Sven gren Holm
Professor, Fashion Management
The Swedish School of Textiles
University of Borås, Sweden

Clemens Thornquist
Professor, Fashion Design
The Swedish School of Textiles
University of Borås, Sweden

Håkan Torstensson
Professor
Transportation Safety and Security
The Swedish School of Textiles
University of Borås, Sweden

Olga Troyanikov
Senior Lecturer
School of Fashion and Textiles
RMIT University, Australia

Sandor Ujvari
Lecturer
School of Technology and Society
University of Skövde, Sweden

Dilys Williams
Director
Centre for Sustainable Fashion
London College of Fashion, United Kingdom

Linda Worbin
Senior Lecturer
The Swedish School of Textiles
University of Borås, Sweden

Xianyi Zeng
Professor
ENSAIT, France
Submitted article manuscripts will be peer reviewed by at least two referees appointed by the editorial board. Article manuscripts can be either accepted as submitted, accepted after requested major or minor modifications or rejected by the editorial board. Submitted images of research objects will also be scrutinized by experts appointed by and, after the assessment, accepted or rejected by the editorial board. Submitted exhibition reviews and book reviews will be subjected to an editorial assessment.

Free access publication
The journal will be published electronically, with free access, six months after the publication date of the printed issue. The electronic version will be published in the University of Borås institutional repository BADA (Borås Academic Digital Archive) http://bada.hb.se/handle/2320/1556.

Guidelines - articles
- Submitted article manuscripts should be original articles, written in English. They must not be published in the same form earlier or submitted for publication elsewhere.
- The text should be submitted in two copies: one editable copy and one non-editable copy in appropriate file formats.
- Photos and other images should be supplied as separate files in an appropriate file format.
- It is the author’s responsibility to obtain the required approval from all the parts involved: authors, photographers, artists and others.
- There is no page limit specified for contributions, but it is recommended that the material is presented in a form that is succinct, attractive to read.
- All articles should be proof-read before submission.
- An abstract of not more than 250 words should be supplied as well as 5 essential subject keywords.
- A biography of 3-5 sentences for each author should be supplied as a separate file.
- References should preferably be in Harvard style (the “name-year system”).
The Harvard system:

**Example, books**
The reference:  
(Finnane 2008, pp. 44-48)  
In reference list:  

**Example, book chapters**
The reference:  
(Breward 2001)  
In reference list:  

**Example, journal articles**
The reference:  
(Studd 2002)  
In reference list:  

**Example 1, websites**
The reference:  
(Victorian and Albert Museum n.d.)  
In the reference list:  

**Example 2, websites**
The reference:  
(Scalway 2009)  
In the reference list:  

**Guidelines - exhibition reviews and book reviews**
For book reviews, bibliographic information should be supplied: author(s), title, publisher and publication year. For exhibition reviews, name of originator(s), title, location and dates of the exhibition should be supplied.