Futures in F3 stands for the challenges that lie before the industry in addressing the economical growth factor and a responsible approach to the future of the planet and all its inhabitants.
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A comprehensive textile research environment is under development at the University of Borås. It combines scientific and artistic competences in the three key areas design, technology and management. Two strong R&D programmes – F3 and Smart Textiles – form the organizational foundation of this environment.

Whereas Smart Textiles is primarily concerned with research on design and technology and the interplay between these areas, the scientific point of departure of F3 – Fashion Function Futures is the interplay between design and management. These two strong research programmes complement and enrich each other.

The idea of Smart Textiles is to develop the next generation textile products. This programme focuses on textile materials with high knowledge content and integrated with modern technology. Applications are available in many areas, such as occupational safety and medical care.

Within the R&D programme F3 the textile value chain in its totality and complexity is the subject of scientific studies. The programme has a multi-disciplinary approach, in accordance with the overall research policy of the University of Borås. It involves research groups from a number of prominent research fields at the University, most notably Fashion and Textile, Logistics and Commerce and Resource Recovery.

A close cooperation between academia and the regional business community is a condition for realization of the application profile of F3. The fact that it resides physically in Borås is part of the auspicious conditions for the programme. Both historic and contemporary factors provide excellent reasons for appointing Borås the textile capital of Sweden. Borås with the surrounding Sjuhärad area holds in its textile tradition a culture-historical heritage of trade and industry; a heritage that lives on and is constantly renewed in the dynamic textile and fashion industry based in the region.

As a knowledge centre, the University of Borås brings the multitude of actors of this knowledge and competence cluster closer together. An important goal is to further develop the Sjuhärad area into a Scandinavian textile and fashion centre of European and global relevance.

Björn Brorström
Prorector
The F3 initiative at the University of Borås is organized as a staff service with the aim to enable and support coordinated research and educational activities within the ordinary institutional structure of the University.
The Swedish School of Textiles

The only multidisciplinary university in Northern Europe with education and extensive R&D in all areas of the textile and fashion value chain i.e. design, technology and Business/Management.

- 1100 students (including 90 master students)
- 30 PhD students and 16 professors and PhDs

The research teams are organized in R&D labs/studios i.e.

**F3**
- ARTISTIC DESIGN STUDIO coordinated by associated prof. Clemens Thornquist
- FASHION LOGISTICS STUDIO coordinated by prof. Hakan Torstensson
- FASHION MARKETS STUDIO coordinated by prof. Lisbeth Svengren-Holm

**Smart Textiles**
- DESIGN LAB coordinated by assistant professor Linda Worbin
- TECHNOLOGY LAB coordinated by assistant professor Nils-Krister Persson

• All the above studios and labs are located at The Swedish School of Textiles.

**F3+ Research Centers at the University of Borås**

The R&D Centres at the University have significant resources for advanced research within the following areas, which all have very relevant connections to and applications for the F3 area. Totally more than 20 senior researchers work with R&D applications related to F3.

**Resource Recovery** at The School of Engineering coordinated by prof. Kim Bolton

**Consumers & Markets** at The School of Business & Informatics coordinated by prof. Karin M. Ekström

**Organizational Resilience** at The School of Education & Behavioural Sciences School coordinated by associated professor Margareta Oudhuis
Artistic Design Studio

History
Development of research in art and design at the Swedish School of Textiles has two main aims: textile design and fashion design. Whereas the artistic research in textile design, as in e.g. the project in and around the Smart Textiles area aims to emphasise the collaboration between art and science through its interaction focus, the research in fashion design has mainly been focused towards art and design methods in fashion design as well as the relationships between artist/designer, design and its audience/society emphasising collaboration between art and the social sciences.

Research in fashion design is part of an effort to further explore fashion design as an area of academic research. Design research can refer to the study of design from, for example, the perspective of sociology, economy, or art history, but it can also refer to research with an explicit aim to develop design practice itself. In the latter case it is a matter of looking for tools and methods to develop a given profession. This type of research is usually conducted through an experimental design practice aiming at theory and methodology development, so called practice based design research.

This has been done through many different research projects with different aims. For many of the projects the basic aim is to contribute to the development of a practice based fashion design research agenda. Starting with unfolding the design process in different organisations they have tried to define basic process models and develop generic methods with a specific focus on tracing central decision points in the fashion design process or suggested methods to resolve the artificial break between abstract theory and concrete practice in the art of giving form to dress and body as an expressive language in itself.

Some projects are examples of artistic research exploring the intersection of art, fashion, philosophy and social organisation focusing on different issues of dress and body from a performance perspective in the everyday social body and its organisations. Others still explore not only the schooling of different perspectives in fashion design, but academia in general as it is understood from the perspective of fashion design as an ambiguous field in-between different university faculties as they rather aim to investigate logic, motives, materials, methods, norms, collections and inferences in fashion design to render discrete inclusive models for art, science and the humanities.

Ongoing Projects
Expression through Cutting
The project aims to break down the boundary between methods and techniques by working with pattern cutting as a design instrument to create interesting garment samples. In so doing, the project tries to refine the view of fashion design
methodology and substantially change its educational practice, to provide design methods based on speed, intuitive actions and awareness of history and traditions and perhaps most importantly to create an understanding of humankind’s crafting of garment and fashion.

Concrete Geometry in Knitting
Work aims at exploring the concept of form and archetypes in fashion design specifically in knitted structure. Through experimenting with different variables in knitting technology and hand knitting the aim is to further explore the form of materiality.

Performing Cultures
Looking at the boundary between garments and objects in performing cultures from the traditional fashion show, classic ballet to modern performance art, work explores the expression of the dress when worn and in motion and how body and dress perform together as a design within a more or less defined sense of audience.

Clothes & Identity: Elaborations through Text, Film and Art
Work examines clothing and identity through different artistic projects such as costume design in motion pictures and dresses for different kinds of live performances. By looking at different scenes where clothes “perform,” identity and dress are studied through clothes as storytellers.

Fashion Imitation
Research investigates organized design work in different kinds of fashion design organisations based on action research through “paralleling”, in the sense of following/shadowing design work in own design work with the aim of developing general methods and process models in the fashion design process.

Future Research Pathway
Nomadic camp for artistic research in fashion and textile design. Together “Integrity: face, body and dress” and “Fashion and function: concrete abstraction of functional wear” makes up a broad based for artistic research in fashion design emphasising on the interrelation between form and sensibility (Plato, Kant, Schiller etc) in terms of body and clothing. However, and very crucially, these research themes, which from an artistic fashion and textile design perspective starts by looking inwards for form, and at concrete form for the development of abstract concepts and functional model, centres around individual participation and the experimentation with oneself as research tool.

Therefore, the more important aspects of building the grounds and horizon for coming artistic research projects in fashion and textile design is not so much what these projects might be concern but rather in what ways these artistic research projects are carried out. Thus, for sensitivity against egotism, for reliability against indifference, for veracity against vanity, the making, development and endurance of the nomadic camp for artistic research in fashion and textile design in many different places world-wide, and equally many different forms, is a main objective to nurture and ensure a future of multidisciplinary artistic research in fashion and textile design.
Fashion Market Studio

History
The fashion industry is one of the oldest industries but is still a global driver of economic development. Despite the fact that manufacturing has been outsourced to low-wage countries it still remains an important sector for a country like Sweden. In 2007 the Swedish fashion industry had a turnover of 73.4 bn SEK of which H&M accounted for about 10 percent. H&M is the largest company on the Stockholm Stock Exchange and among the hundred highest rated brands worldwide. But the industry embraces a large number of companies, micro companies as well as small and medium sized ones. The fashion retail sector in Sweden employs 30,000 people but we also have to add people in fashion related sectors, for example transportation, magazines and advertising. Fashion is thus a sector of interest for research from a management perspective.

Despite its many positive connotations, the fashion industry is also criticized for causing ethical and environmental problems globally. Streams of reports show miserable working conditions in the manufacturing process; the environment suffers from dangerous chemical processes; animals are abused and exploited and consumer consumption causes mountains of rubbish, etc. Fashion is thus an interesting sector for research, both from a management and from a sustainability perspective.

Fashion management research is a rather new field as fashion research traditionally has sociological or cultural perspectives. Fashion management is developing into a field of research that addresses issues of management relevant for the fashion industry as well as sustainability and corporate social responsibility issues. At the Swedish School of Textiles a new research program, F3 -Fashion Function Futures, has been initiated to meet the needs of industry, academia and society, starting with five research projects:

1. The Design of Prosperity: Fabrics of the Future
2. Sustainable Fashion – A Driver for New Business Models
3. Managing Knowledge in Global Garment Markets
4. “New Hybrid Luxury” and Indigenous Craftsmanship
5. Fashion Design Strategies and Licensing

Ongoing Projects
The Design of Prosperity: Fabrics of the Future
The Design of Prosperity-Fabrics of the Future (TDP-F2) in the form of an action research project, has the purpose of creating a competence center that clusters a design laboratory, consisting of an “Artisan-ship” atelier linked to a New Media lab and a New and Humanistic Marketing unit (Gummesson, 1987; Carbonaro and Votava, 2008) to develop, seed and steward the concept phase and the prototyping not only of sustainable and innovative textile objects, clothing, art and design works “Made in Sjuhäradsbygden” but also innovative business ideas and business formulas globally valid for the design of new models of economic, ecologic, social and cultural prosperity.

Sustainable Fashion – A Driver for New Business Models
This research project aims at generating knowledge of the development of second-hand, which includes the development of vintage; new second-hand store trends and how value is created as one step of creating sustainable business models. One of the key questions is how the relation between fashion companies and consumers can change towards more sustainable consumption. The research project consists of two parts. One part takes a consumer perspective and addresses the issue of how the consumer creates meaning in the consumption of fashion products. The other part focuses on the producers and retailers. To address this question we will make a survey of the existing second-hand businesses and an in-depth analysis of the new models that emerge as a way to develop new business models in the fashion industry. The in-depth study will be conducted through interviews with both companies and consumers to identify the ideas of the business, how the consumers value the experience and the effect on their consumption.

Managing Knowledge in Global Garment Markets
This project aims at generating new knowledge about how companies which have their own design department – or the equivalent of that – make use of the designer knowledge they have in their relations to their suppliers. The key question of the project grows out of the dilemma they face: On the one hand the transfer of information and knowledge to their suppliers and on the other hand, making sure that they stay in control of the knowledge that makes the company unique by not transferring this knowledge. To address this dilemma the project will study, in detail, knowledge and knowledge transfer. The knowledge referred to in this project is central for the branded retailers, as it is part of their identity. The central question of the project is: How do companies handle knowledge about design in relation to their suppliers? This question calls for a concrete study of the buyer company(ies) in possession of this knowledge, and of the supplying company(ies) getting it as a result of their interaction across the market. Participant observation and interviews are of utmost importance when addressing questions of knowledge, not least since we may expect it to be partly latent. More specifically, this means: (1) identifying and characterizing this knowledge; (2) studying the relationships between actors in the market; (3) investigating what information is given away and what is kept in the company. This project will provide us with information about the role of knowledge in companies, how companies work with knowledge, and – on a more practical level - what strategies they develop to do manage their knowledge and their market position.
The innovation level in the fashion sector has been rather low despite a culture of creativity. With the increasing need for new business models we have identified both a desire and a need to raise the level of innovation. The aim for the Fashion Market Studio is to generate concepts for new business models aiming at a sustainable fashion industry by studying how value is created from a consumer perspective as well as an organizational perspective. The research projects will use different approaches based on both ethnographic methods and action research where new concepts will be developed in collaboration with companies and organizations.

“New Hybrid Luxury” and Indigenous Craftsmanship
This research project examines the possibilities of working and integrating indigenous groups/craftsmanship as a creative approach and a socially responsible solution towards the luxury industry, potentially resulting in an innovative resource, supply chain, and innovative answer to a social and global problem. The research will also examine the use, impact and possibilities of integrating modern communication platforms to launch the project within a new framework that’s not just print base. This can also add to the “story telling” of the development of the product that is not only on a sales or PR level but also on a company CSR level. Fully integrated socially responsible attitudes – not just something that companies and brands contribute to financially, but something that is integrated into all processes of product developments, distribution etc.

Fashion Design Strategies and Licensing
This research is based on analysis of a selection of literature on the best practices in licensing management and design management, on interviews with certain players on trademark licensing within the global fashion industry (licensor-side and licensee-side) and on action research projects with licensor/licensee companies. The literature was selected in order to represent views of some current top practitioners in design/licensing management, on the three levels of strategy, tactics and operations. Current general corporate strategy theory is also considered for a broader perspective and to help bridge design management and licensing management.

Future Research Pathway
The fashion industry is one of the oldest industries but globally still a driver for economic development. Despite the fact that manufacturing has been outsourced to low-wage countries it still remains an important sector also in Europe and for a country like Sweden. The industry embraces a large number of companies, a few large companies, many small and medium sized companies as well as many micro companies.

Fashion engages people. Fashion is the means of creating identities and is intimately related to the way we live. Fashion consumers are the core of the business and hence an important field of knowledge. The development of Internet and social media has given consumers a tool for influencing fashion. The market conditions and how to communicate with the market have changed.

Despite its many positive connotations, the fashion industry is also criticized for causing ethical and environmental problems globally. Streams of reports show miserable working conditions in the manufacturing process; harmful environmental pressure; animals are abused and exploited and consumers’ consumption cause mountains of waste etc.
Fashion Logistics Studio

History
Logistics in the fashion goods sector, or briefly fashion logistics, is characterized by significantly volatile products, with fluctuating demand and low forecastability, importance of product availability at time of purchase and a great dependence on lead time. Demand chain management, DCM, is about developing customer relationships and understanding, in order to achieve that marketing and sales are coordinated with supply chain management in order to provide the best customer value. This leads beyond traditional research in logistics, which has focused on the operational flows and related information systems in order to increase efficiency by minimizing the cost and coordinating the tactical and operational levels.

Fashion Logistics and DCM support each other in order to develop and maintain an effective and client-based distribution of fashion goods, and the University of Borås is at the forefront of logistics, investing in research in the field. Fashion Logistics and DCM are aimed at creating a platform for continued education and research in logistics/DCM at the University of Borås, and also constitute a resource for development of business. Research in logistics/DCM has focused on the operational flows and information systems. The purpose has been to increase efficiency through cost-minimization and coordination at tactical and operative levels.

Knit-on-Demand
The Knit-on-Demand project is about developing and demonstrating novel methods for customization, production, and delivery of knitwear, thereby implementing more agility in customer relations, improvements with regard to logistics and supply chain management, reduction of the risk for obsolescence, low sell-through, returns and faulty forecasting and in some cases adding a new and interesting shopping experience and facilitating near-by manufacturing including lesser environmental impact. The research part of the project has analyzed several methods and approaches for one-piece manufacturing of knit products, a demand chain perspective on the logistics involved and lead-time optimization, the customer-adapted design process and different retail and customer communication solutions. The final result is a working knit-on-demand supply chain, where a customer can order and, within certain limits, design her garment in a store (or later via the web), the garment will then be knitted, treated and packed at a local knitshop and delivered within a few weeks.

SecureFlow
The SecureFlow project consists of a series of constituent projects. Security threats on transports covers mapping and analysis of actions against goods, and other transport goods related crime, and an overview of which systems can be used for prevention and to limit damage. Assessments of risks and existing security measures are treated within the framework of supply chain risk management.

The term crime displacement (that crime follows the path of least resistance) is debated but must be considered when devising action. Risk management along the transport chain where investment models for risk management and basis for cost-benefit analyses are treated in detail. E18 as a security corridor and laboratory for security research is also examined in a project. The information technology of the future, for the purpose of securing integrity and tracking, is available in a report on the current situation in technology and an analysis of intelligent transport systems. Consequences in the logistics system covers a range of approaches, among them how legal and illegal logistics systems interchange, how the problem is perceived by the transport industry, how the much debated question of creating secure parking might be handled.

Supply Chain Resilience through Quality Management
The length and complexity of the supply chain tend to increase and thereby make the supply chain riskier and less predictable and hence more vulnerable. The challenge for businesses today is creating a resilient supply chain, in order to manage and mitigate risk and vulnerability. The purpose of the project was to explore and describe the use of a combined quality management philosophy in logistics processes, in order to influence supply chain resilience.

The findings were supported by six case studies. The studies show that there is plenty to gain if organizations are able to have combined quality management philosophies as they are complementary. TQM has its strongest emphasis on the commitment and involvement of all employees. Lean is a discipline that focuses on process speed and removing waste in order to increase the customer value. Six Sigma benefits from the added focus on variability and design of products and processes. It has been indicated that a combined quality management philosophy makes logistics processes more reliable, flexible, agile and robust. Collaboration with the suppliers and customers by extending a combined quality management philosophy outside the focal company is important in order to make the whole supply chain resilient.

Ongoing Projects
BraM – Brand & Merchandising Manager for SMEs in the Children’s Products Sector
The BraM project focuses on development of education and training. It will develop a ‘BraM’ web-based course, addressed to obtain a rights management of children’s fashion brands in the market. The results of the project will be applicable to all SMEs working in sectors with high value of the brand, and with a commercialization channel composed mainly of multi-brand and/or independent retailer shops. BraM objectives are to define a professional profile for the Brand Manager of SMEs in the children’s fashion sector. A European standard curriculum for the training, including a qualification and recognition framework, an ICT-based train-
Therefore, this project will also focus on the impact of collaboration, in defining the fashion industry was one of the first sectors to be affected by the globalized economy. Research will be based on statistical data and publicly available factors a company can control to achieve competitive advantages in global business are related to innovation, responsiveness and resilience. Thus the ability to produce innovative, high quality, highly value-added products and services and bring them quickly and effectively to the market is instrumental for fashion enterprises.

The proposed project will identify, assess and, where feasible, measure the factors that have been instrumental in fashion and textile enterprises’ success in a globalized setting and provide a basis for assessment of other sectors too. The main factors a company can control to achieve competitive advantages in global business are innovation, responsiveness and resilience. Thus the ability to produce innovative, high quality, highly value-added products and services and bring them quickly and effectively to the market is instrumental for fashion enterprises. Therefore, this project will also focus on the impact of collaboration, in defining perceived consumer value, designing innovative products, enhancing supply chain agility and mitigating supply chain risk.

There will also be research on the theory of international trade, global division of labour, global supply and demand chains, supply chain risk and design-driven demand. That may be required to develop new models and tools for analyzing and interpreting statistics in relation to globalization and its interaction with the targeted economies. Research will be based on statistical data and publicly available information with a number of case studies as additional background for analysis, conclusions and validation.

Demand Chain Management in the Fashion Sector Forecasting of demand, consumer preferences and fashion trends are difficult. Decisions regarding collections are often made 6 to 12 months before vending season. Production is outsourced to far-away locations, which increases lead times. As a result one third of products sourced by retailers does not meet demand and must be sold at reduced prices. Some of the products cannot be sold even at clearance and they must be given to charity or dumped. Products in demand sell out quickly. Retailers cannot afford to buy more of them as their cash is still tied down in unsold products. Due to long lead-time replenishment orders would not even be possible. Purchases exceed demand in general, which wastes raw materials and energy.

Most garment and footwear producers have joined the globalization by outsourcing their production to Eastern Europe or the Far East. Retailers carry out direct sourcing at the same locations. The only means of competition seems to be the purchase price. This research focuses on a wider range of means of competition, e.g. is it possible to improve profitability in retailing by switching from long lead time up-front buying to continuous, short lead time sourcing, and if so, how much higher can the purchase price be? What is the ecological impact of demand driven sourcing from nearby areas, when considering transport costs, material utilization, need of energy and waste? What kind of production, communication and planning facilities and tools are required for an ecologically effective and fully demand driven sourcing-production-supply chain?

Future Research Pathway The fashion industry has successively become the focal sector for innovation in logistics and DCM. As focus is shifting from provider-driven mass production and mass marketing to customer-oriented production and customized relationship marketing, the interest increases for the stimuli that can be obtained from the fast moving consumer goods. This requires new approaches, in which the interaction made feasible in the F3 programme can provide a leverage effect on development.

The proposed pathway for research in fashion logistics and demand chain management includes interdisciplinary issues necessary for a smooth and sustainable flow of materials and information and for management of the textile value chain from concept to satisfied customer. Starting from fundamental logistics research on transportation, distribution, warehousing and inventory management, the planned research also comprises elements of customer value creation, addressing consumer insight, design implications and demand forecasting; information and communication technology support including social media and supply chain visibility; quality drivers in logistics, e.g. TQM and Six Sigma, resilience and sustainability issues including risk, safety and security research, remodeling, recycling and reverse logistics.

These are issues that are strongly interrelated and must sometimes be addressed concurrently for proper understanding and development of the fashion supply chain and its relationship to design, customer value and demand. This takes into account the crucial importance of logistics and appropriate value chain management for resilience and sustainability. The project catalogue has been developed to reflect this approach.
Socially Sustainable Consumption on the Multicultural Market
The aim of the project is to analyze the multicultural market and multiple work places in order to be able to contribute to the development of socially sustainable grocery consumption. The research project is intended to develop knowledge of consumption patterns and consumer decision-making on the multicultural market. The focus is on analysis of consumption in families and how grocery consumption takes place in families, from a multicultural perspective. The project is also about how grocery stores organize their operations, with multicultural concerns, both regarding recruitment and management of staff. The project studies religious holidays, more specifically the Ramadan. Apart from interviews with families and store personnel, observation studies are made. Both businesses and consumers can benefit from shedding light on the potential of the multicultural market.

The Meaning of Consumption in Economic Vulnerability
The study is intended to uncover the meaning of consumption among economically strained consumers. The consumption of today, which takes place in a context of material abundance, must be looked at from new perspectives. In order to understand how the consumption society affects different groups it is also important to study those who live on the margin, especially in development towards increased gaps in income. By studying consumption in conditions of economic vulnerability we might get more knowledge of the importance of consumption for the experience and importance of participating and taking part in established society. The study is based on interviews with families.

The Phenomenon That Is Ullared – A Prestudy
The project highlights the phenomenon of Gekås in Ullared, a unique meeting place for trade and consumption. The project highlights Gekås from different perspectives, such as entrepreneurship, information technology, billboard, client orientation, service meeting, family consumption, Ullared in the media. Observational studies were done both inside and outside the store, and on the nearby camping site.

The Qualitative Business Meeting - Striking a Balance between Self Service and Human Contact
More and more companies are introducing self-service technology, exemplified by virtual assistants on their homepage, to the interaction between customer and business. They hope to thereby increase the customers’ service options, and also to save money by reducing the number of people tended to the clients. Customer evaluations and experiences of services are largely based on the individual meetings that take place between employees at a company. Throughout the project there is development of knowledge of how a balance between self-service and human contacts can be reached. The project is to be seen as interdisciplinary with competence coming from several academic disciplines such as marketing, informatics and linguistics. The project is carried out in cooperation with SAS. In-depth interviews, observations and registrations of the interaction in service meetings between customer and customer service, and customer, virtual assistant are the main methods in the qualitative research approach.

Ongoing Projects
In the area of marketing, research focusing on consumer behavior, trade, services, design and the construction of markets including networks, is conducted. Research takes both producer and consumer perspectives. They are not each other’s opposites, but coexist on different markets, traditional, digital, in networks of interactions and interrelations. Customer orientation is highlighted as a condition for satisfying customers and successful business. A societal perspective is considered necessary in research, which strives to address ecological, economical and social dimensions of sustainability. Research is conducted in the following fields:

• Consumer behavior (e.g. consumption culture, consumption patterns, buying behavior, attitudes and motivation)
• Marketing and organizing of services (e.g. the tourism industry and city planning)
• Marketing practice and construction of markets in retail trade (especially new marketplaces created by new technology and the Internet)
• Development of new products and services, focusing on how to develop them for interaction with customers (the connection to the Internet is fundamental)
• Customer service and service meetings focusing especially on use of self-service technology, critical events (like negative customer behavior and how staff handles that) and value creating processes in the communication between customer and staff
• The uniqueness of service companies, focusing on what is vital from a management perspective when creating competitive service companies

Researchers in marketing at the University of Borås are experienced in research on consumption behavior and consumption culture, for example through studies of family consumption, consumer socialization, collection and design. Research on various markets is relatively comprehensive and has in part been conducted through studies of industrial markets and in part through studies of consumer markets focusing on both retail trade and various services trades. Research has been done on companies operating in the Sjöharad region, which to a large degree deal in fashion goods, and on a large number of companies that are involved in retailing and mail order. The field of marketing at the University of Borås has involved studies of fashion by studies of companies operating in retailing fashion goods. In the environmental field, studies of consumer behavior have been conducted.
Resource recovery

History
Our current levels of consumption place a large burden on the earth’s limited natural resources and leads to a continuously increasing production of waste. In addition to waste from agriculture, forestry and industry, we now produce more than 2 million tons of household waste per year worldwide. The textile sector’s 70 million tons of waste needs to be managed in a better way for a sustainable future. For example, it is possible to manufacture textiles from biodegradable sources, it is possible to reuse or recycle entire textile products or the different parts that constitute the product, and it is possible to transform the textile ‘waste’ to energy (e.g., via ethanol and biogas production, combustion and gasification).

Resource recovery at the University of Borås performs research into all of these areas and hence makes a significant contribution to our quest for a sustainable development. In addition, the research that is done in this group spans the range from fundamental understanding of the chemistry and physics in the textile materials and recovery processes to applied research using locally available pilot scale plants. Moreover, the research has direct application in industry since most of it is conducted in collaboration with external partners such as SP Technical Research Institute of Sweden, Borås Energi och Miljö, Renova, Chalmers University of Technology, Metso Power, Profu and Danfoss. All of these partners are active in the Waste Refinery centre located in Borås. The resource recovery group at the University of Borås develops new, and improves existing, methods to address the problems of waste treatment. These methods are applicable to a large variety of wastes, including textile waste.

Ongoing Projects

Computational Modelling of Cellulose Decomposition
Pre-treatment of cellulosic materials (such as cotton) is needed when using it to produce ethanol or biogas. Hence, optimizing this step is central to production of both forms of energy. The chemical structure of the waste needs to be broken down before it can be used to obtain energy. Since very little is known about the decomposition of these structures at the molecular level, a huge variety of methods have been tested and are still being tested to improve the pre-treatment. The computational modelling used in this project complements these resource-intensive studies. The cellulose chains are packed by strong hydrogen bonds in so-called ‘elementary fibrils’. These elementary fibrils are attached to each other by hemicelluloses, amorphous polymers of different sugars as well as other polymers such as pectin, and covered by lignin. The micro-fibrils are often associated in the form of bundles or macro-fibrils. This tightly packed structure makes cellulose resistant to the biological and chemical pre-treatments. Our calculations will identify the type and strength of bonding that prevents easy decomposition of cellulose, as well as suggest ways to improve the chemistry in order to make the decomposition more efficient. This may also involve calculating activation energies and Arrhenius pre-exponentials, which can then be used to obtain the decomposition kinetics.

Ethanol and Biogas Production from Waste Textiles
The project of converting cellulose-based waste textiles (cotton and viscose) to ethanol and biogas has been active since 2007. Cotton has a share of about 40% of the fibers in the global market with a volume of about 30 million tons per year. In this project, cotton was first hydrolyzed by dilute-acid, and then by enzymatic hydrolysis followed by fermentation to ethanol. However, since the ethanol yield was not so high, increased efforts were dedicated to pretreatment before enzymatic hydrolysis. Several methods such as alkali pretreatment with NaOH, concentrated acid process with phosphoric acids were applied, while the best results were obtained with dissolution of cellulose in NMMO. In this way, the yield of hydrolysis of more than 99% were obtained, and the resulted hydrolyzate were successfully converted to ethanol. Furthermore, biogas production after the pretreatment were also applied and resulted into full digestion of the cotton to biogas.

Future Research Pathway
All processes involved in designing, producing, marketing, selling, using and discarding clothes have a negative impact on the environment. Nevertheless, it is important to continue and develop these processes for economic and social development. However, this development must be sustainable. To achieve this goal we need to know which processes have the largest impact on the environment, and subsequently reduce this impact without substantial economic losses for the people involved in the textile chain. A tool that is used to ascertain the environmental impact is called ‘life cycle assessment’ (LCA). This method can be combined with an economic analysis, since both environmental sustainability as well as economic and social development are important. We propose to use the LCA tool, preferably combined with a corresponding economic analysis, to study the entire cradle-to-cradle chain (i.e., from resources used in clothing production to resource recovery from waste). This is an extremely ambitious goal that will be achieved by many collaborative sub-projects. For example, a specific clothing product, or class of products, will be selected for assessment. We will then perform LCA on each of the processes involved in the textile chain, beginning with the processes that are a priori expected to have the largest environmental impact. The LCAs from each process with subsequently be combined in an LCA for the entire chain for this particular (type of) product. Other types of products will also be studied with the aim of creating an LCA methodology that is applicable to all, or the most important, product types for the Swedish clothing industry. This methodology should be made user-friendly so that designers, and

Prof. Kim Bolton
other key actors, who may not have a deep understanding of LCA can apply this tool when developing new clothes and fashions.

The project will be conducted in close collaboration with experts in the LCA field, who may be external to the University of Borås, and will require information on environmental impacts from researchers in, for example, the resource recovery group.
Organizational Resilience

History
Research on cooperation at the CAV (Center for Work Life Science) and common knowledge production between researchers and representatives of the business sphere.

The CAV has shown that there is good potential among researchers and member organizations for jointly producing knowledge. That is shown by the book, The Audacity to Lead through Change. A Question of Confidence, which was published by Studentlitteratur in 2009, and whose authors are active business leaders in the CAV leader network, and two researchers associated with the network (Rolandsson & Oudhuis, ed. 2009). The book provides several examples of the importance of leadership distinguished by humility and courage, with participation and delegation as linchpins. The active cooperation between representatives of work life and researcher has further been described, analyzed and theorized in national as well as international publications (for example Oudhuis, 2003; Oudhuis & Rolandsson, 2007; Rolandsson & Oudhuis, 2008; 2009). The importance of establishing trust and working with long-term perspectives, among other things, are described in these publications.

Ongoing Projects
The Consortium for Organizational Resilience in the Sjuhärad Region, KORS
The project is about the establishment of a business consortium managed by an interdisciplinary research group at the University of Borås. The consortium intends to coproduce knowledge about organizational resilience in order to support businesses in developing practices that might enhance their ability to handle external crises and strains successfully. The consortium is part of the well-established center CAV (Center for Work Life Science). Through the CAV’s cooperation with businesses in Sjuhärad, the consortium intends to conduct practice-oriented knowledge promotion in a field that is very important to Swedish business. The research questions are meant to be based on areas where research highlights how factors such as economic, technical or social resources might help make organizations vital and resilient.

Work Life and Academia in Common Creation of Knowledge – For Who and For What?
The project inquires into the creation of knowledge developed in the meeting between diverse representatives of work life and academia in the Center for Work Life Science (CAV). The study mainly highlights what goes on in the CAV’s four smaller networks, where the member groups consist of a wide field of actors, but which also cover other parts of CAV’s operations. The research questions that are highlighted in the study are also about how the common creation of knowledge is organized, and what diverse organizational designs mean to the knowledge creation that takes place. In addition, the knowledge interests that the actors involved base their action on are studied, as well as how those interests are expressed in meetings practitioner to practitioner and in meetings between practitioners and researchers. The project also examines how these conflicts of interest are handled and whose perspective becomes dominant. The knowledge interests of the actors and the common organization of knowledge creation are analyzed on three levels; cooperation for regional, organizational and individual development.

Choice and Design of Work Organization and Production Systems – Causes and Consequences
This three-year project, conducted with funds from the Research Council for Work Life and Social Science, FAS, has an overarching goal of highlighting the development in Swedish manufacturing industry over the past ten years, when it comes to choosing labor organization and design of production systems. Margareta Oudhuis at the University of Borås and researchers at Chalmers University of Technology jointly conduct the project. The consequences brought by aforementioned choices, concerning content and working conditions for those employed in various production systems, are clarified for workers with collective wage agreements, production workers and white-collar workers active in production. Two separate manufacturing companies are part of the study. The research project also highlights how some key people at various levels in the chosen companies describe their reasons for choosing the work organization and production systems they have chosen, and assesses the development over the coming ten years.

A Changing Software Industry
The project aims at studying innovation in open environment research, an FAS project about the comprehensive change of production models in the software industry. The background is that open source applications have changed the industry. The background is that open source applications have changed the conditions on the software market. That is accentuated by the fact that in over 80 countries there is policy work aiming at legislating about or promoting the use of open source in public procurement of computer systems. For the software industry that change has brought along new development processes, new reward mechanisms, new ways of delegating work and new business models. The project’s focus is the programmer, the profession possibly most affected by the development, and what the software industry’s change against increasing use of open source means to the programmer’s professional life and what work related dilemmas arise. The concept of professional life is the importance that a programmer ascribes his work, based on expectations on their professional role as well as experiences of more mundane assignments.
Future Research Pathway

A multidisciplinary research group at the University of Borås, covering most departments, is about to establish a Consortium for Organizational Resilience in the Sjuhärad region, called KORS. Besides being a platform for learning and knowledge exchange the consortium aims at generating active development- and research projects in co-operation with participative companies and organisations. The foundation of KORS is being financed by funds from KK-Stiftelsen.

Specific research questions are being formed by researchers together with companies and organisations, within specific areas in need of special attention and investment/development; a development aiming at building up economical, technical and/or social resources that are supporting each other. This is in turn done in order to make the organisation resilient or robust and resistant to different kinds of crises and challenges as well as to sharpened competitiveness.

The consortium is in turn linked to CAV, the Center for Working Life and Academy at the University of Borås, an established organ for co-operation between the university and companies, municipalities and other organisations in the surrounding region. Companies and organisations that are members of and making up CAV are also taking part in these joint interactive research- and development projects.
RESEARCH SEMINARS

Research seminars


Ave, Masayo (2010). “Haptic” - the value of tactile sensitivity, and sensorial aspects in material, working for and with young creators, craftsmen, professionals as well as children from a variety of areas and countries.


Billger, Monica (2009). Architectural colour research comparing real rooms to virtual reality simulations.


Ekdahl, Annika (2010). Understand, innovate, manage?

Hedman, Sofia K A (2010). Conceptual fashion and art combined with a keen commitment to experimental fashion curation.


Jarg, Monica (2009). Why can not the carpet be of wood?


Lindqvist, Richard (2009). How techniques create the design and the importance of working in a beautiful way to create beautiful and interesting garments.

Lundgren, Sus (2010). Design Critics – What is aesthetics?

Redström, Johan (2009). Combining philosophical and artistic approaches with focus on experimental interaction design.


Sand, Monica (2009). Getting lost in research methods.

Surplus Wonder (2010). Designs with strong concepts generates both economic surplus and creative wonders.

Suromi, Mika (2010). KOBAKANT, collaborations explore the realm of wearable technology as a medium for commenting on technological and social aspects.

Unander-Scharin, Åsa (2009). *Multistable corporealities: technology and phenomenology in choreographic process*

Vallgårda, Anna (2010). *The computer as a material for design*

Von Busch, Otto (2009). *The emerging of small scale fashion ecologies, or “baazars”.*

Wingård, Rasmus (2010). *Design at Filippa K.*
Books


Carbonaro S. et al. (2010). The Design of Prosperity. CTF. The Swedish School of Textiles.


Thornquist, Clemens (2005). The Savage and the Designed, The Swedish School of Textiles, Borås (CTF)


Thornquist, Clemens (2008). Notes on Method 2: Experiments fashion design, The Swedish School of Textiles, Borås (CTF)


Thornquist, Clemens (2008). Narrations from the inanimate, The Swedish School of Textiles, Borås (CTF)

Thornquist Clemens (2009). Ontologia Pupae, The Swedish School of Textiles, Borås (CTF)

Thornquist, Clemens (2009). Logica Referendi, The Swedish School of Textiles, Borås, (CTF)

Thornquist, Clemens (2009). Philosophia Academiae, The Swedish School of Textiles, Borås (CTF)
BOOK CHAPTERS

Book Chapters


Hallnäs, L. (2009). The all-important difference… concepts of creativity in the fashion design process. The Nordic Textile Journal, vol. 1


ARTISTIC STUDIO


Hallnäs, Lars. (2005). The Dark Room Fashion Show, Sensuous Knowledge 2, Bergen National Academy of the Arts


Hallnäs, Lars. (2007). The all important difference… Concepts of creativity in fashion design, Presentation at Sensuous Knowledge 4, Bergen National Academy of the Arts 2007, Bergen


Thornquist, Clemens. (2006). Presentation of Why wearables? and group moderator/workshop leader Electronic Etherealism: a conference exploring the intersections of fashion, technology and creativity and energies dialogue & a community of practitioners and thinkers, Digital Arts Department, Pratt Institute, Brooklyn


*Complete publication list can be found in BADA (www.bada.hb.se)
Thornquist, Clemens. (2008). Reclaim the University, Paper presentation and proceedings, Sustainability in The Textile Fashion Industry Chain: From Crop to Shop, NISTI, New Delhi

Thornquist, Clemens. (2008). Panelist, Sustainability and ethics in Fashion, 16th Annual IFFTI Conference, Melbourne


FASHION LOGISTICS STUDIO


SELECTED PUBLICATIONS


FASHION LOGISTICS STUDIO


RESOURCE RECOVERY


ORGANIZATIONAL RESILIENCE


Conferences


Ellwanger, Marion, *Sport&Leisurewear: Smart and Intelligent Materials*, International conference NEST (Nordic Centre of Excellence for Smart Textiles and Wearable Technologies), The Swedish School of Textiles, Borås, Sweden (2006)


Exhibitions

Eriksson, Kajsa. (2007). PeptolisAllYouNeed, Performance: Transformers: We are leaving you now Ronneby, Transformers: Goodbye, Förbi Glende Minne, Ronneby
Eson Bodin, Ulla (2005). Knitting Performance, catwalk, Gällstad Textile Weekend, Gällstad
Hallnäs, Lars (2008). Six fashion designers, photo exhibition, solo exhibition at The Swedish School of Textiles, Borås, Sweden and Gallery KG52, Stockholm
Thornquist, Clemens (2005). Contemplation in Research. Photographic exhibition Stockholm University, Stockholm
Thornquist, Clemens (2006). Portraits of a Fashion School: group exhibition, photographic investigation of fashion design education as part of a larger exhibition on fashion, Ginza Gallery House, Tokyo
Thornquist, Clemens (2006). No labour in the labour intense textile industry: a photographic research project dealing with the global chase for labour in the Textile and Fashion business, The Design of Prosperity summit, Borås


Thornquist, Clemens (2008). Narrations from the Inanimate – life, form and death: Solo exhibition of an artistic research project investigating and expressing the role, concept and context of the body in fashion creation through more than 50 higher education fashion schools visited world wide. IMA Gallery, Istanbul


Thornquist, Clemens (2008). Narrations from the Inanimate – a voyage through world fashion schools: solo exhibition, artistic research project investigating and expressing the role, concept and context of the body in fashion creation in world fashion schools, Gallery KG52, Stockholm

Thornquist, Clemens (2008). Expressions in wearing, photoexhibition, Gallery KG52 Stockholm


Worbin, Linda (2005). Rather Boring, Svenska ambassaden i Brasilien


Worbin, Linda (2006). Design 4 Elements, Designcenter in Essen


Worbin, Linda (2006). Dutch Design Week, The Swedish School of Textiles exhibiting together with Matereo, Eindhoven


Photos

Cover photo: Christer Månsson, Studion • Design: Ulla Eson Bodin
Back photo: Jan Berg
p. 1 Jan Berg
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p. 13 Ulf Nilsson
p. 15 Lars Hallnäs
p. 16 Måns Lænje/SVID
p. 19 Anna Sigge (the two at the top), Jennifer Tydén (left bottom), Evert-Jan Haarhuis (right bottom)
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Fashion Function Futures

A comprehensive textile research environment is under development at the University of Borås. It combines scientific and artistic competences in the three key areas design, technology and management. Two strong R&D programmes – F3 and Smart Textiles – form the organizational foundation of this environment.

Within the R&D programme F3 the textile value chain in its totality and complexity is the subject of scientific studies. The programme has a multi-disciplinary approach, in accordance with the overall research policy of the University of Borås. It involves research groups from a number of prominent research fields at the University, most notably Fashion and Textile, Logistics and Commerce and Resource Recovery.

A close cooperation between academia and the regional business community is a condition for realization of the application profile of F3. The fact that it resides physically in Borås is part of the auspicious conditions for the programme. Both historic and contemporary factors provide excellent reasons for appointing Borås the textile capital of Sweden. Borås with the surrounding Sjuhärad area holds in its textile tradition a culture-historical heritage of trade and industry; a heritage that lives on and is constantly renewed in the dynamic textile and fashion industry based in the region.