

To Graduating Students UAL 2021

‘Textile Designer: A Work in Progress’ (Reflections on designing and learning)

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I am aware that ‘the designer’ is an impossible concept, as designers are Individuals – not one person. I believe uncertainty is a valid design position, so already I am trying to talk for you and for me. I’d like to direct my talk today towards things that interest me -and, I hope, you too - and about ideas to increase environmental sustainability through textile design, since I believe it is the most important thing facing all our futures.

That’s not to say the most important factor in making work is not the pure excitement, curiosity and fascination with materials processes and random responses to life in general....it is! But you need to see that in a bigger context of the part it plays in today’s world.

Here is my plan for the talk. The image is from brave modernist architects & engineers of the 1960s who built Paternoster lifts like this in many new buildings, now, amusingly – it looks like impossibly old technology from about the 18th Century. Now Paternoster lifts are pretty much universally decommissioned for health & safety reasons, as you can imagine - a constantly moving (slowish) conveyor belt for people in tall buildings and the button you see in the centre was to stop the lift not to call it. A never-ending chain loop of open compartments were on the move, slow and wobbly, but enabling a jump on and off at will ... eventually without much hesitation ... starting and ending your journey singly or in groups. It made getting to know one another very enjoyable. I chose this image as a reference to my beginnings way back **and** as a metaphor for an aspect of my talk today, as loops of circularity and continuous flow.

My BA course was in Leicester Polytechnic, which became de Montfort University. I was very attracted to the then ‘new offer’ of many art school disciplines in one place in Higher Education - a very exciting prospect. Every subject area had new specialist equipment & lots of regular visiting freelance practitioners on the teaching teams encouraging individual freedom to create amongst students.

Already there was a sense that the big traditional textile production and the kind of design associated with it, was migrating geographically, leaving the UK for places with cheaper production costs. But that was also a kind of design release – it encouraged textile designers to be freed from convention and to experiment with smaller studio production, often in collaborations of all kinds.

And, weirdly, I think the world we graduates were going out into had many parallels with today’s very conflicted and troubled scene politically, socially and financially. It was tough to survive then too, but I believe that now, unlike then, the opportunities for designers to find

a role for a creative contribution – to be visible through technology - and to gain acceptance for innovation from your leaps of imagination *have* some credibility today in the worlds of finance and industry. The transition from products to systems and services only increases the opportunities for textile designers, taking on design challenges of working with multiple users, repair, disassembly, novel waste streams and virtual worlds.

First, I must say, the scope and depth and variety of the work on exhibition from Chelsea textiles students this year is more enlightened and relevant to today's world than anything I have seen to date and MA is still to come. Congratulations to students and staff, practitioners themselves, for the challenging year behind you and the exciting years ahead. Graduates and students coming along can benefit from the ideas and methods - seen in the round and communicated online - to absorb them into future practice. I find many of the same ideas current in the work of other design subjects across all UAL Colleges – common ground. There's good reason to be confident that emerging designers have empathy with the human condition and want to affect production.

Pressing world issues, environmental and social, are the context in which design and creativity flourish. When problems with multiple causes resist clear solutions, then creative thinking becomes essential. I believe the record for most patents ever recorded was in USA in 1930's in the middle of a deep recession. Inventiveness comes from necessity not abundance. In *'Antifragile'*, Nassim Taleb says that frequent mild recessions are good for an economy as it fuels creative innovation – just as mild ingestions of bacteria are good for a constitution. Whole 'life cycle' thinking or 'circularity' can conceive of the important issues in designing materials and products.

However, circularity is a very general term without the nuance of everyday realities ... it often does not distinguish between the lifetime of materials and that of products ... which are often very different.

Firstly, creative thinking often means we work on what feels like a good idea and then rationalize it later. There's nothing wrong with that. We have to try it out in a 'build it and they will come' mentality. And we may need nothing more as a stimulus than a purely physical response to materials, or processes, or a search for beauty. There are many more good ideas that we can post-rationalize than pre-rationalize. That does not make creative thinkers irrational as is sometimes suggested, since imaginative leaps are hard to justify in science or a 'measure-reliant' discipline such as engineering, medicine, or economics. Only a very few respected and experienced scientists can work on a 'hunch', which is a code word for a lot of inherent knowledge. The scientific method requires an approved & safe process. This is almost always to build the next move on what is already known. The same in business, since few financial investors will back ideas without data.

Secondly, designers are also 'problem-solving' in their thinking – the first problem to solve is how to make an idea concrete - a grappling with technique is needed, for real and virtual expression.

Textile designers particularly have a design process suited to collaboration – we make 2D or 3D models – even to understand what we are thinking about. The workshop – real or virtual

– is part of our traditional studio. ‘Making’ is the way we ‘realise’ even our own thinking, enjoy it, critique it, share it and see how it inspires or translates for a specific context. And key to this is the design prototype –or sample. Discussion with other disciplines then has a focus. Nigel Cross, in *‘Designerly Ways of Knowing’*, said : As a way of working and thinking, design sits between science, which observes the facts of the material world and the humanities, which interpret the complexities of human experience. Design takes a middle path and is primarily concerned with that fragile quality which is achieved when the best of human intentions are realized within the constraints of reality. Design blends the concerns of science and the humanities to search for outcomes that are balanced and opportunistic, grounded in the real world but driven by human aspirations.

Textile design is often speculative. I want to emphasise that not all intentions are formulated as problems to be solved at the outset. For instance - images here are from the studio of designer Hella Jongerius. Her practice is a continuous exploration of material forms – here exploring ways to weave 3D architectural structures. She often ranges over several disciplines and not always with a ‘final outcome’ in mind, like a provisional solution in search of a problem. The completed pieces are inspiring when taken on and developed for architectural innovation or interiors & furniture. It’s a playful and oblique way of exploring structures by using a range of materials and scales to test their transferability in different contexts. Hella makes 3D forms with membranes and skins, woven plastic structures, multi-axial Jacquard weaving, folded patterned forms, felted dyed fibres, recycled inner tubes, plaited solar strips. She proves that you can be a designer and be interested in more than just ‘the new’. Hella says she is interested in ‘what could be’ and all her work ends in provisional outcomes with an unknown future.

Creative thinking is not exclusive to art and design, but it is our major contribution to general discourse, since creative methods are characterized by leaps of imagination. Here are two examples of creative solutions to problems identified by designers at Halle Burg University for whom I set a project asking students to design an object, system or service to last a short time but *must* be sustainable. Since ‘lifecycle’ thinking is a very general & theoretical term, it doesn’t deal with everyday realities. For example, it rarely distinguishes between the lifetime of materials and that of products, which are often very different. We can create products to last a long time. Also, those in which the product is temporary but the materials are long-lasting, depending on a wider assessment of impacts and benefits. To illustrate a couple of outcomes, on the left you see billboards advertising upcoming events. Usually on paper, these instead were coated with light sensitive pigment so that the projected images were able to fade & disappear after a few days. The hammer on the right is a solution to having tools when you need them – the use of a vacuum and ... everyday household objects were the basis for construction. Using store cupboard food, the tools could be cooked and eaten afterwards ... temporary tools. Design can be purposeful but playful. in the urgency of circularity of materials and material flow, the point can be well made with humour. The impact is on material choices to produce a piece of work and what is involved in its onward journey, in terms of use, care and disposal. From the beginning of our research group at Chelsea we also were conscious that we were the architects of a product’s onward journey, because of our design decisions.

This image is of the first big collaboration within our textiles research group at Chelsea. It is also a collaboration with other disciplines to design, dye, laser cut and transform a big interior space. A collaboration across design and science, created an atmosphere which gave participants the freedom to explore ideas through discussion and shared exploration. The serendipity of outcome was more innovative than conventional enquiry. Designers have a method of pushing a proposed concept 'till it breaks' as a way of establishing strengths and weaknesses in a model. A new, and more durable proposal can then be built which can be subtle and eccentric, reflecting all disciplines – what is then key is the rigorous analysis of performance from the scientific method to ensure it's a credible solution.

To do this, a design idea often needs to be realized by collaboration with other disciplines. In this example we worked with a physicist to make scientific images accessible to a lay audience. An experimental installation communicated the beauty of scatter patterns from scientific research. In x-ray crystallography, diffracted rays of light are collected on a photographic plate to produce a model of a structure on a molecular scale. The scatter patterns were used as imagery for printed, laser-cut environments. Our prototype textile samples enabled us to trial theoretical ideas for sustainability. Laser cut images were installed using light projection. Non-invasive magnetic structures were used for temporary fabric suspension. 'Ready-mades' provided decorative elements and natural indigo was tested on cheap, light industrial, non-woven fabrics. Everything from the installation was intact & stored for re-use after disassembly.

Of course, not all cross-discipline collaborations are with sciences & technologies. Many textile designers are interested in garments & fashion outcomes. Designer Maria Blaisse has worked in collaboration with dancer Kenzo Kusuda. It opened up new ways in which she could think about her practice and has a strong link to the inter-connection between movement and costume. It also makes a connection with the transition from product to services and systems thinking. Blaisse says – "my work is based on a continual investigation into the possibilities of a material. This process produces many possible applications. Essential factors are simplicity, clarity, beauty, sustainability and an optimal use of the material and its qualities. Ultimately: to incite the flow of continuous creation, no waste, no loss of energy alert and alive."

So, what is going on in our heads when we design and when we think creatively? I am fascinated by the investigations in Behavioural Sciences. Work by Daniel Kahneman and others in 'Behavioural Economics' offers a very compelling argument about brain function in relation to conscious and unconscious decision making. Kahneman and Tversky use the theory that the brain has a fast and slow function. The hypothesis is explained in *'Thinking Fast and Slow'*. The main thesis is that the brain is split between two modes of thinking: 'System 1' is fast, instinctive and emotional; 'System 2' is slower, more deliberating and logical. The book delineates rational and non-rational motivations/triggers associated with each type of thinking process, and how they complement each other. Kahneman maintains they have established through experiment & observation, that people always make decisions intuitively (using fast brain) and then justify the decision with logic (slow brain) and both are necessary for us to function. Design thinker Anne Thorpe says "Designers have a particular range of skills that makes them capable of working with fast or slow knowledge possibly serving as a bridge between the two".

Neurologist Roger W. Sperry's 1960s theory is that people are either left-brained or right-brained, meaning that one side of their brain is dominant. It's based on the fact that the brain's two hemispheres function differently. It's called the dominant preference & is used as a theory for the identification of 'personality types'. If you tend to be more creative or artistic, you are thought to be right-brained *System 1 FAST*. If you are mostly analytical and methodical in your thinking, you're said to be left-brained – *System 2 SLOW*.

When applied to the process of designing textiles, especially if the artefacts we make as an outcome, could persuade others to change their behaviour, to actually WANT a more sustainable lifestyle, we are 'reframing' the problem. Also, striving for beautiful colour, joyful pattern or elegant simplicity all appeal to the right brain activity, which triggers decision making, in this theory. So something like 'If people believe in the conclusions then they find the arguments convincing' would translate into – 'if you were knocked out by the sheer desirability of the product - then you buy into the brand's ethos & narrative'. To get behaviour change, as advertisers well know, you must appeal to *System 1* (fast instinctive & emotional). Since your beliefs come from childhood -psychologists tell us – logic does not change your beliefs. *System 1* needs to be convinced. Then *System 2* articulates the logic and adopts the narrative. Behavioural scientists observe...that people are committed to doing a) what is familiar and b) what other people are doing. So instead of using persuasion via logic and statistics to change mind sets, why not make it easier and more attractive for people to change their behaviour; make it easier to evaluate information; make more transparent the system you hope they will adopt. Generally, an improved environment eases decision making.

So, as a designer who wants to have influence must '*Hack the Unconscious*', to paraphrase Rory Sutherland -Vice CEO of Ogilvy Advertising. Design the sustainable textile product and make sure it's what people want. Or give people what they want & make sure it's sustainable. Cameron Tonkinwise (2015) pointed out that the job of design is not connected to "the creation of artifacts, whether communications, products, or environments. But the practice of design is actually about persuading a wide range of actors – fellow designers, suppliers, investors, logistics managers, users in households, workplaces or public spaces, etc. – to work together on materialising a future in which such an artifact exists."

So, all the empathy of textile designers - all the love of material qualities – the inventiveness and hunger to touch and shape things – all the love of collecting – the love of nature and culture – the humour and ingenuity – the love of repetition – of surprise – of symmetry and asymmetry of incongruity – simplicity and complexity – and ... the celebration of differences. Since design can only inspire change rather than demand it, shouldn't all that go into producing work which creates value over time? Design for sustainability *rightly* concentrates on the planetary benefits of 'slow', with an emphasis on product *longevity*.

Better practices are really brilliant and getting more attention, but they are still ignored by the increasing number of consumers of cheap, fast fashion. Consumption is increasing in wealthy countries and in poor countries, too, as they become wealthier. To have any effect on the problem, several things need to happen soon. A range of actions worldwide: some financial, penalising retail companies if they benefit from unsustainable practices in the

supply chain; some legal, curbing manufacturers ability to profit from exploitation; and some behavioural – finding ways to ‘nudge’ a change towards longevity and slower consumption. Here’s where design and technology are both in the business of imagining and creating irresistible alternatives to the many unsustainable current offers. When services replace ownership, designers can add it to their practice.

High quality goods can always be designed for maximum lifespan – this has failed to recognise the potential to provide solutions to buying cheap, especially for groups with limited means. If a circular flow is to be profitable from goods made from cheap materials, it must profit from speed, a transformation of the material and all carried out with sustainable processes. Design for disassembly at the outset – local production to reduce transportation – an aspiration of repair. ‘Cool Tools’ are needed, to analyse complex problems. Tools for sustainability. On the left are Brian Eno & Peter Schmidt’s ‘*Oblique Strategy Cards*’. A pack of cards each with an observation or question to encourage lateral thinking, were originally for musicians in rehearsal spaces who found they had writers’ block. They provide a very interesting way to speak to the ‘right brain’ when the ‘left brain’ says it has nothing to give.

The TEN strategy cards developed here at Chelsea in the textiles research group, now the Centre for Circular Design, when the group of practitioners & teachers needed to be informed on how to address intractable problems and the lasting implications of design choices. Our research focus on sustainability gradually evolved into our approach to the definition and communication of good design. It became clear to us that decisions at all stages of the life-cycle of products and materials have a significant role in approaching sustainability and that the old linear model of design, production, use and disposal must be developed into a circular model with waste streams as raw materials as well as virgin. Also the speeds with which products are moving from design to waste is speeding up as profits are in the material production, product manufacture, and retail distribution parts of the circle. We needed to map the field, develop tools to help us define the challenges, formulate approaches across disciplines, investigate services connected to products and connect stages of the lifecycle as yet discreet in their silo-like industries. We, and the rest of the world, are *still* only just getting started. The 10 cards developed to identify the tactics & map the field to suggest opportunities for change & innovation in practice research. The cards also identify & question the way to challenge the intractable problems of unsustainable systems of production and disposal.

Cards 1 – 5 relate to materials and production systems, whereas 6-10 are concerned with human behaviour, how we use textile products and their meaning. They provide an important combination of material & systems development with behaviour change. *Selecting from the TEN STRATEGIES, prototypes can be developed, which explore an interconnected view of design and can feed into ‘Question Coding’*

Designing textiles, which contribute to sustainability, comes under the category of ‘wicked problems’ so called not only because they are difficult, but because they are imprecise & conflicted. This guide identifies an area for consideration rather than a directive ie. It is not prescriptive. It was developed from IDENC’s question fanning techniques and problem solving analysis.

I'd like to give you three examples of designers tackling this question from the perspective of their own practice.

The first is Designer Rebecca Earley

Barriers to be overcome to solve the problem:

- Too many vested interests in keeping the status quo to change
- Sustainability exhaustion / public distrust (incl. greenwashing)
- Lack of accurate, comprehensive information re environmental measurement
- Fashion shopping has become part of the entertainment industry
- Many people feel they cannot afford better quality
- Absence of tempting alternatives to frequent, cheap shopping
- Technologies relevant to improvement are unavailable or require investment
- Consumers do not (or choose not to) understand their significance in the lifecycle of fast fashion
- Maintain employment without perpetuating the current problem
- Unimaginative legislation
- Material waste is not sufficiently desirable or valuable to avoid landfill
- Value of fast fashion is seen as solely material and monetary

Form a question from the selected barriers:

Barrier:

- Material waste is not sufficiently desirable or valuable to avoid landfill

Becomes:

- How can material waste become sufficiently desirable and valuable to avoid landfill?

Form into Design Brief: reactive to current waste streams

- How can waste garments be upcycled?
- Polyester represents 50% of waste garments.
- Transform them into desirable fashion pieces without compromising the future recyclability of the material.

Select a polyester charity shop shirt, complete with stains.

Using heat transfer as an inexpensive process, 'Up-cycle' the garment through a design intervention.

Rebecca's practice includes heat transfer processes applied to unreconstructed & most unloved charity shop polyester shirts added years to garment life and transformed them into desirable collector's pieces.

TEN Cards: 1/ 3/ 4/ 5/ 8/ 10

Second: Designer Kate Goldsworthy

Barriers to be overcome to solve the problem: (see barriers above)

Form a question from the selected barriers:

Barriers:

- Technologies relevant to improvement are unavailable or require investment.
- Material waste is not sufficiently desirable or valuable to avoid landfill

Become:

- What accessible technologies could transform the material?
- How can value and desirability be added to avoid landfill?

Form into Design Brief: proactive towards future waste streams

- Select a polyester charity shop garment.
- Deconstruct the garment into pattern pieces for design intervention
- Transform it into a desirable fashion, using laser technology to create surface-effects
- Produce a totally mono-material high fashion garment, complete with surface interest / texture, in recyclable polyester and market it solely on aesthetic qualities and price.

TEN Cards : 3 / 4 / 5 / 8

Third Designer: Kay Politowicz

Barriers to be overcome to solve the problem: (see barriers above)

Form a question from the selected barriers:

Barriers:

- Consumers do not (or choose not to) understand their significance in the lifecycle of fast fashion
- Maintain employment without perpetuating the current problem
- Material waste is not sufficiently desirable or valuable to avoid landfill

Become:

- How can consumers understand their significance in the lifecycle of fast fashion?
- How to maintain employment without perpetuating the current problem?
- How to avoid material waste going into landfill?

Form into Design Brief: proactive to paper & textile waste streams

- Enable consumers to understand their significance in the lifecycle of fast fashion
- Maintain employment without perpetuating the current problem
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Brief:

To develop the potential for nonwoven cellulosic-based products to deliver high quality touch and visual aesthetics in a fashion context - as a single use or low launder garment to be biodegradable when discarded into a system for recycling.

TEN Cards: 2/ 3 /4 /5/ 6/ 10

So, the three previous examples lead me to describe design outcomes related to individual practice of Becky Earley, Kate Goldsworthy and myself. The idea that the two kinds of waste - product and material - have different trajectories and, therefore, speeds.

It became clear that if it were visualized as an extreme lifecycle diagram '*fast – slow*', it would be possible to differentiate more clearly between product and material thus opening up new ways to design. Our particular interest in material circularity led to an interest in the speed of flows, which is different for each kind of textile product. Design decisions could shift products from the vast production of mid-priced clothing and migrate it towards a longer or shorter useful life. A new generation of products with a short lifespan & could be linked to services of subscription and material recovery.

It led to the work subsequently developed in the big research project 'MISTRA FUTURE FASHION'. Swedish research foundation MISTRA funded a cross-discipline project from 2011 to use the fashion industry as a case-study for 'profitable' environmental innovation.

Our textiles design research group at Chelsea was selected to participate as one of the diverse collaborating specialist teams from academic institutions. All were Swedish except for Copenhagen Business School & our UAL textiles research group here at Chelsea – thanks to the earlier involvement by Becky who was known by H&M through her expertise in communicating design for sustainability. There were 15 research partners & 50 industry partners – with a budget of around 110 million Swedish Sec or £100 million

Added to the academic inputs were a huge range of businesses. - Swedish retailers like H &M; Lindex; KappAhl; Åhléns; Nudie Jeans & Filippa K and European manufacturers in the supply chain for fashion related products and reuse – including Myrorna; i:co & Lenzing.

In 2015 four 'Themes' were established: Design, Supply, User & Recycling

The main driver of the 'Design Theme' research, led by our London group, was to find more collaborative ways for design to work with other disciplines towards systemic change in the fashion industry. It involved many academics from different disciplines across the other three MFF themes; supply, recycling and user behaviour.

Would product longevity and the slowing down of existing fashion systems hold up as the only sustainable option? Or could we defend a complementary approach moving at a faster pace than most environmentalists might approve of, but with effective recovery of materials outweighing the many negative impacts in more frequent production cycles?

In order to fully understand the range of potential improvements across this varied spectrum of speed we focused on the extremes:

1. A super-slow approach may include multiple fast lives which build over time to reveal a slow product, which can serve not one but many users over a long time-frame in a people-

focused brief. In the Service Shirt concept material state changes were embedded into a pre-emptive design process, enabling users to experience a variety of different ownership, rental and updating services, across a 50-year period.

In order for the *Service Shirt* to last 50 years it has to change hands many times; moving between moments of single use and ownership to shared use contexts with the brand owning and releasing the product again. A process of overprinting the shirt would give it new finishes within the first 19 years. Later the shirt would become the lining for a jacket and then finally jewelry, before going into chemical recycling to reclaim the fibres.

To understand more about the potential for extending use with traditional consumers, the researcher spent time with a family to gain insights into how a shirt might be used and reused within the family and friendship circle. Figure 11 shows the users at their home; spending time with them aided the design decision-making process for the researcher and generated ideas for how the overprinting services might work with the 16-25 age group.

2. An ultra-fast approach might entail a short-life compostable or easily recyclable product which is designed with only a few or even a single use in mind at the outset, but by recovering it over and over again actually keep the materials in use over the longest time. We consider '*product longevity*' as a way to describe extending the life of garments to improve their cost per wear impacts during their useful life.

We consider '*material longevity*' as the perpetual recovery potential of synthetic fibres, which although embodied in short-life garments are not lost to the materials system at end-of-use. Concepts were tested and reviewed as results started to come in from our partners and eventually were expressed as the physical garment prototypes and samples some of which you see here.

From ultra fast (on left) to super slow (on right), the thinking was tested in the *development* of materials (left) and the *selection* of materials (right) – both included processes to preserve the most effect from each extreme concept - garments to wear only a few times – no launder – paper recycling or industrial composting and a 50 year projection through many users and progressive modifications finally to chemical recycling.

fast research team

The '*Fast Forward*' exhibits are the work of Professor Kay Politowicz & Dr Kate Goldsworthy in collaboration with CCD PhD researcher Kathryn Hall, Paper development from Dr Hjalmar Granberg, Consumer testing by Siv Lindberg. Lifecycle insights came from Sweden-based experts Professor Greg Peters (Chalmers), Dr Gustav Sandin and Dr Björn Spak (RISE), Dr Sandra Roos (RISE:Swerea IVF).

The prototypes are made from a new bio-based nonwoven material co-developed with Dr Hjalmar Granberg at the Research Institute of Sweden & the University of the Arts London. The composition of the paper is a mix of cellulose pulp and bio-based PLA fibre, making the garment 100% biodegradable or recyclable in existing paper recycling systems.

For the slow research team, the '*Service Shirt*' exhibit is the work of Professor Rebecca Earley (CCD), in collaboration with CCD PhD Researcher Laetitia Forst and designer-maker

Katherine Wardropper. Lifecycle insights came from Sweden-based experts Professor Greg Peters (Chalmers), Dr Gustav Sandin and Dr Björn Spak (RISE), Dr Sandra Roos (RISE:Swerea IVF).

Business model feedback came from Professor Esben Rahbek Gjerdrum Pedersen and Post Doctorate Researcher Dr. Kirsti Reitan-Andersen (Copenhagen Business School). CCD LDOC Post Doctorate Researcher Dr. Marion Real provided mapping insights and structure around people and place.

A good narrative was needed to revolutionise the idea of fast fashion, via a radical material-focused brief. It was a great opportunity to mimic the poetic qualities of transient cycles in nature and provide the nutrients for an ecology of fashion. In the Japanese tradition of '*Mono No Aware*', short cycles in nature such as cherry blossom, or falling autumn leaves are appreciated and prized for their dazzlingly brief existence.

Innovation starts with mimicking the familiar. It also starts with hacking existing systems across a range of industries – I have long been interested in the potential for the non-wovens industry to take on a role in sustainability, as scientists in our collaborations testified. Non-wovens are usually variations on polyester, but they cut out the whole spinning and weaving or knitting stage of production and so have an impressively good environmental footprint in energy and transportation. They could also accommodate a large percentage of waste and recycled fibres.

To recover virgin-quality materials from existing textile waste streams, *Design for Recovery* starts with the end, reverse engineering the product and even the material. Rapid developments in recycling technology is providing some hope for future material recovery. Pilot experiments in fibre-to-fibre recycling for high value new products: cellulose, polyester & nylon. Waste streams from other sectors eg food waste into fibre production & dye technology.

In-built design features enable more efficient systems to support material recovery. Designers familiar with end-of-life recovery systems can make their design choices count towards improvement. Design for disassembly/ use of monomaterials relating to either the biological or technical system of recovery support finishes that are compatible with product end-of-life stages.

Innovative production systems reduce overall impacts of garments and 'lighter' production – vertical manufacturing systems or decentralised manufacture can be distributed & connected to highly technological systems to improve environmental impact

The specialist contribution of Penny Walsh (AO designs) devising methods for applying natural dyes onto papers of all kinds, to achieve chemical-free material values.

The brief was set to:

- Develop a material based on a renewable, natural source, grown without pesticides or additional water.
- Process economically, without toxic additions, social or environmental compromises.
- Maintain employment in distributed manufacture through industrial collaboration and technological development.

- Be wearable, with little or no need of laundry facilities, saving water energy & ocean plastics.
- Collected, recycled & recovered material at end of life for repeated production in same or other industry
- Industrially compost waste for nutrients
- Environmental impact of the cycle measured against existing models.
- Promoted to investors & consumers as an attractive & desirable development for sustainable fashion

In the design & material development for ‘fast forward’, I collaborated closely with Kate Goldsworthy. Throughout the project Kate was hugely influential in the technological treatments we could devise for attractive material features, technological surfacing and performance. We, at UAL, worked closely with the material scientists at RISE to develop the new bio-based textile-like nonwovens on a paper machine. In order to make a convincing material for garment use there were a number of properties associated with wear and tear, such as strength, foldability and resilience to water from rain and perspiration, which had to be fulfilled. The purpose of this part of the project was to improve the understanding of how the choices made at the paper machine and later, at the finishing stage, can influence the span of textile-like properties of the finished textile.

Samples with low PLA fibre content showed excellent strength, and hand crimping imbued samples with stretch and a muffled sound. Samples with a large PLA fiber content showed considerably lower strength but were softer to the touch. A spot-welding pattern at a 3 mm distance, similar to the fibre length, increased both strength and strain at break. Industrial dry creping resulted in excellent stretch and some drape.

This study demonstrated that it is the interplay of choices made at the paper-machine, such as mixture of input fibers, in combination with choices at the finishing stage, such as crimping and welding, that determines the span of textile-like character possible to obtain in a paper-based nonwoven material. The pulp-rich paper was dyed in conventional, hot, natural dyebaths, although to dye at the pulp stage would be preferable. It proved to be very strong, but too stiff to be wearable in its manufactured state, so finishing techniques were employed for both functional and aesthetic purposes.

For fast fashion to become more sustainable and be complementary to durable quality products, industry must also seek profit from the circuit of material flow or subscription services to add value. The approach to designing for ‘fast’ should differ from slow, heritage garments. A particular fast aesthetic should be developed - and celebrated – from the constraints and advantages of a new fast system. Beauty comes from attention to detail in production, especially through mass automated systems

Design and user perception is not a small issue! Consumer experience of the textile-like material is important, and wearable material must conform to properties that are usually associated with textiles, such as softness, tactility, flexibility, stretch, strength, drape and a sound-dampening effect. A function of textile design is to influence consumer perception and final acceptance of the material. Finishing and conversion processes support a large range of possible visual and haptic expressions.

In this study, consumer responses to our new nonwoven paper-based materials were tested (Lindberg, 2018). Our original brief was to try to achieve a paper textile which felt like cashmere as this was perceived as the ultimate luxury fabric.

In the results over 65% of the test group found this sample acceptable to wear. Samples 52 and 53 were the ones eliciting most surprise over the fact that they were not textiles, In other words – people liked the material if they didn't know it was paper – if they did they were frightened of social embarrassment – it might leave them naked in public.

A whole other set of new design prototypes need to be explored, including the addition of linings to reduce laundry and overlays to change effects.

Work from the project is currently touring as part of the V & A exhibition "Fashioned from Nature" about to return from its recent exhibition in China, which apart from our wearable paper, includes several other current material research developments for more sustainable fashion.

During the same period we embarked upon an innovative 'researchers in residence' pilot project with Filippa K to undertake embedded research with industry. During this project we exposed our thinking and concept development to the FK team and supported the development of their 2018 Front Runners garments. The project surpassed expectations and resulted in both a fast and slow concepts from FK; both being launched in London in November 2018 with a co-curated exhibition and press-launch 'Disrupting Patterns' (Goldsworthy, Earley & Larsson) and again in Stockholm's Fashion District at the Mistra Future Fashion closing event 'Outlook Days'. Filippa K's 'Eternal Trench Coat' was immediately acquired by the V&A museum in London as part of their permanent Fashion Gallery showcase.

Of course, many other projects have contributed to the work of the research Centre before and since – and many have included similar collaborations. I think I can say we have all, at various times, experienced the benefits of bringing a textile designer's sensibilities to a multi-disciplinary team and of gaining insights into our practice from other disciplines. I believe that assumptions are no longer that the textile designer in the group is one who waiting to be given an opportunity to decorate. To design is to create and creating is the beginning.

Design theory offers many explanations to the designer about what design is, but beware, academic design language can help to avoid reality within its conventions. You, the practicing designers, are really in the business of 'knowing through doing'. It's what separates the ideals and the clichés from the daily reality & struggle. You have the option of experiential learning and critical reflection, which will continue throughout your practice. [Aristotle](#) wrote in his work on ethics Around 350 BCE, "for the things we have to learn before we can do them, we learn by doing them". You can make sure that sustainability is not just a marketing term to assist poor design. You know that selecting 'natural materials' is not the way to improve products – what improves them is truly understanding their performance. The best material or process is the one you select for its appropriateness in any given context ... and remember innovation is nothing without a sustainable improvement.

Although the maker's voice is not the loudest one in academic discourse, it is authentic and valuable and needs to be included in the publications of theoretical ideas. So strengthen your convictions and keep them by you whenever you are facing practical compromises. Think "what is the wrong I want to right", as the sustainability of you, the individual designer, is the priority.

Thank you!

(6,528 words)