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The Future of Textiles: Disruption and Collaboration

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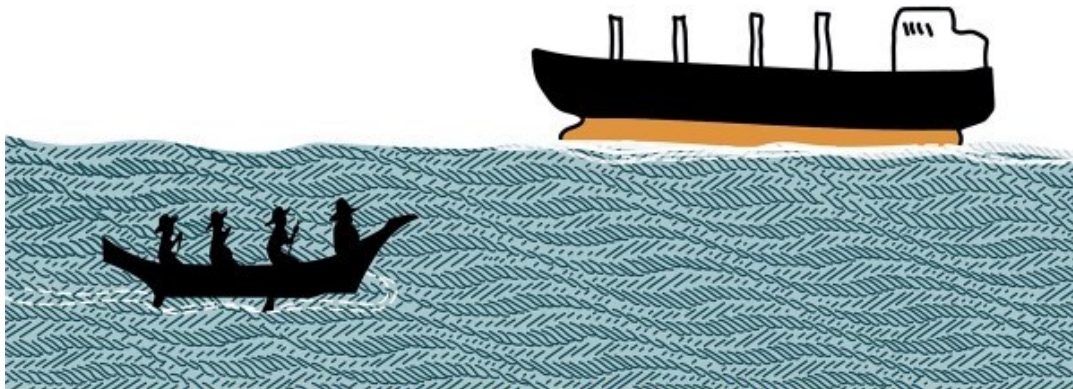
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The Social Fabric: Deep Local to Pan Global



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The Future of Textiles: Disruption and Collaboration

Susan Brown and Matilda McQuaid

Introduction: Susan Brown, Associate Curator, Cooper Hewitt Smithsonian Design Museum

Moderator: Matilda McQuaid, Deputy Curatorial Director and Head of Textiles, Cooper Hewitt Smithsonian Design Museum

Panel: David Breslauer, Chief Scientific Officer, Bolt Threads; Suzanne Lee, Chief Creative Officer, Modern Meadow Inc.; Anais Missakian, Professor and Department Head of Textiles, Rhode Island School of Design and designer in residence, Advanced Functional Fabrics of America (AFFOA); Abby-George Erikson and Salem van der Swaagh, Eileen Fisher Design Work

At this symposium, we celebrate the community, culture, and astonishing continuity of textile making – a constellation of material practices that has endured for thousands of years. As deeply rooted as those practices are, textile making has also experienced profound technological disruptions throughout its history. Often, the textile industry has driven innovations that have consequences for technology more broadly.

Today, we are poised for another upheaval -- another Industrial Revolution. A number of positive and negative forces are driving fundamental changes in where and how things are made. Global climate change, lack of food security, and concern about overwhelming quantities of waste and toxic pollution are altering our priorities for land and resource management. How will we re-design global textile and apparel manufacturing at the systems level to align with our current and future needs? Advances in digital and bio-engineering are opening up new possibilities to mitigate the high environmental and social cost of our current system by proposing collaborations in areas as diverse as biology, medicine, agriculture, food science, animal activism, sanitation, and resource management.

This panel will look at cross-disciplinary collaborations and positive disruptions that are expanding the definition of textiles, bringing together the seemingly opposed concepts of natural and synthetic, handcrafted and high-tech.

If the Industrial Revolution of the 19th century was built largely on developments in engineering and chemistry, this 21st century revolution owes a great deal to biology. The lack of food security experienced by much of the world's population makes us question whether it is viable or ethical to devote so much of our land and water resources to growing cotton, or raising sheep for wool or cattle for leather. A number of researchers are studying bio-fabrication, looking for ways to grow new materials in the lab by harnessing the metabolic processes of yeasts, fungi, or bacteria. MycoWorks, for example, is developing a leather made from mycelium, or mushrooms.



MycoWorks Mycoleather. Image ©MycoWorks

Cross-disciplinary teams of designers, engineers, and scientists are using this technology to grow spider silk, leather, fur, and horn, aims that align with concurrent efforts to create cultivated protein sources, bringing small-planet thinking over from food science into the world of textiles. Suzanne Lee of Modern Meadow, pioneers in bio-fabricated leathers, and David Breslauer of Bolt Threads, one of the companies synthesizing spider silk, will speak more to this approach.

Others are exploring new and sustainable sources of cellulosic biopolymers, which would reduce the use of petrochemicals for the production of synthetic yarns, and the harmful emissions released in the process. Biopolymers are also biodegradable and carbon-fixing while they are alive. Kelp, for example, is faster-growing than bamboo, absorbs five times more carbon dioxide than land plants, filters toxins out of the ocean and provides habitat for marine life. Algiknit is one company exploring kelp-based fibers.



Algiknit, fibers synthesized from kelp. Photo©Algiknit

The need to conserve water has led to numerous developments in waterless dyeing, trans-genetic colored materials, and bacteria dyeing, in which bacteria are “trained” to produce various

pigments as a by-product of their metabolic activity, eliminating the use of petrochemicals and significantly reducing water usage.



Natsai Audrey Chieza, bacteria dye. Photo: Natsai Audrey Chieza

We are all aware that the textiles and apparel industries are among the most polluting in the world. Almost all design programs today teach zero-waste manufacturing, and a number of firms are putting it into practice by using their own production waste in new and inventive ways. In our 2016 exhibition *Scraps: Fashion, Textiles, and Creative Reuse*, we featured contemporary designers using textile industry waste to create new products with a handcraft approach, and we will hear more from Abby George-Erikson and Salem van der Waagh about Eileen Fisher's pioneering efforts in this direction.



Nuno, Tsugihagi textile made from cutting room waste. Photo©NUNO

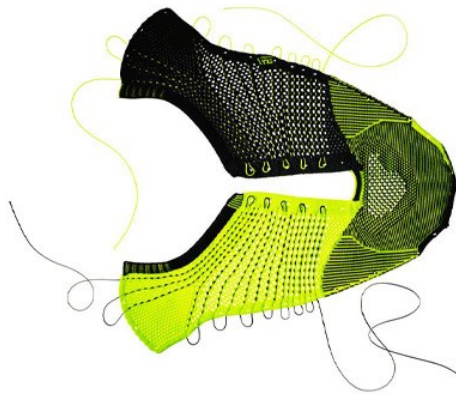
Use of regenerated fibers is increasing across the industry, as is research in methods to separate the components of problematic blended yarns. There are also numerous efforts to address the issue of plastic pollution, especially ocean plastics. Adidas has collaborated with Parley for the Oceans to making running shoes from plastic waste recovered from ocean shorelines.



Adidas, Parley for the Ocean Ultraboost X. Photo©Adidas

New manufacturing techniques promise to reduce or eliminate waste at the source. These include 3-D knitting, 3-D printing, and bio-printing, or 3-D printing with organic materials. Digital knitting is not new, but with its highly controlled and precisely customizable design capabilities,

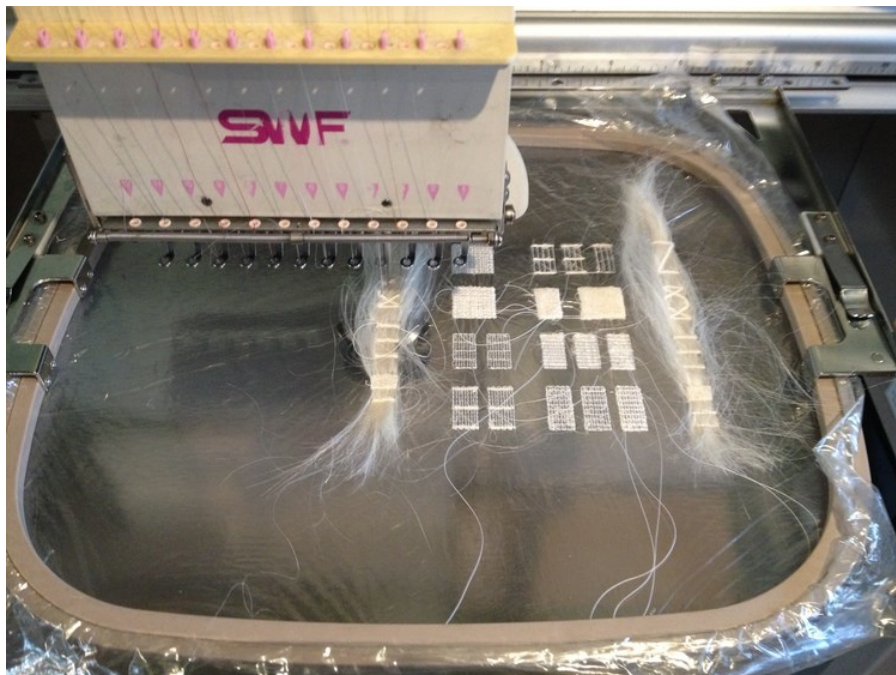
it is a rapidly growing way of creating engineered fabrics for a variety of functional purposes. Nike's Flyknit technology, for example, reduced the number of components in their running shoe from 37 to 2.



Nike Flyknit Racer knitted upper. Photo©Nike

We can also expect to expect more from our textiles.

Amy Congdon is using machine embroidery to develop the ideal scaffold for tissue growth, with the potential to grow new human organs and tissues for repair of the body.



Amy Congdon, machine-embroidered tissue scaffolds. Photo: Amy Congdon

BioLogic reactive fabric, developed by MIT's Tangible Media Group with New Balance, is bacteria-driven – the cells move in response to moisture, allowing sweat to evaporate and cool the body.



MIT Tangible Media Group and New Balance, BioLogic reactive fabric. Photo©MIT

Serious advances have been made in integrating semiconductor technology directly into fiber materials. One compelling application is the concept of knitted muscles—yarn-based actuators that could make it easier for people with disabilities to move.



Harvard BioDesign Lab, Soft Robotic Grip Glove with fiber actuators. Photo: Harvard BioDesign Lab

Stoll's balaclava has a knitted-in circuit powering a heated mesh which warms air before it enters the body, to reduce lung infections in winter athletes. Anais Missakian will share recent developments in smart textiles.



Stoll knitted balaclava with heating mesh. Photo©Stoll GmbH

When we talk about future materials, we may be tempted to ask why textiles at all? Is it an outmoded technology? The continuity we are celebrating is due in large part to the fact that the definition of textiles is generous, encompassing a wide array of materials, processes, structures, and functions which are constantly being adapted to meet our changing needs. Textiles is a lot of different technologies, with a vast, existing infrastructure in place, and tremendous expertise supporting it. Textiles also have a favored status in relation to the human body, and as we begin to expect more from them, their flexibility, comfort, and familiarity may help us to integrate technology more seamlessly into our lives.

Susan Brown is Associate Curator of Textiles at Cooper Hewitt, Smithsonian Design Museum, where she has organized numerous highly successful exhibitions with accompanying publications, including *Fashioning Felt*, *Extreme Textiles: Designing for High Performance*, *Color Moves: Art and Fashion* by Sonia Delaunay, *Quicktakes: Rodarte*, *David Adjaye Selects*, and *Scraps: Fashion, Textiles and Creative Reuse*. She also teaches in the Masters' Program in the History of Design and Curatorial Studies offered by Cooper Hewitt with Parsons/The New School for Design.

Matilda McQuaid is Deputy Director of Curatorial and Head of Textiles at Cooper Hewitt, Smithsonian Design Museum. She has organized nationally and internationally acclaimed architecture and design exhibitions with accompanying publications including “Josef + Anni Albers: Designs for Living” (2004), “Extreme Textiles: Designing for High Performance” (2005), “Color Moves: Art and Fashion by Sonia Delaunay” (2011), “Tools: Extending Our Reach” (2014), and “Scraps: Fashion, Textiles, and Creative Reuse” (2016).

David Breslauer began researching silk as a PhD Bioengineering student at the University of California, Berkeley. He is co-founder and Chief Scientific Officer at Bolt Threads, a company

using bio-engineering concepts toward materials innovation. His Research and Development team is working on the design and production of new silk polymers with desired performance properties.

Anais Missakian is Professor and Department Head of Textiles at the Rhode Island School of Design and designer in residence at Advanced Functional Fabrics of America (AFFOA), one of the National Network of Manufacturing Innovation (NNMI) Institutes, established by former president Obama. AFFOA's mission promotes the transformation of traditional fibers, yarns, and textiles into highly sophisticated integrated and networked devices and systems.

Abby George-Erikson and Salem van der Swaagh are both members of the Eileen Fisher Design Work team. DesignWork, EILEEN FISHER's latest sustainability initiative, is a creative exchange among makers who felt and stitch consumers' used garments into wall hangings, upholstery and accessories for interiors, hospitality and public spaces.

Suzanne Lee is the Chief Creative Officer of Modern Meadow Inc., a New York-based team of scientists, engineers, and designers exploring new ways to create sustainable, cultured animal materials, such as lab-grown leather. She is also the founder of Biofabricate, an annual summit to discuss the interaction of design, biology, and technology.