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Global Expert Mission US Sustainable Innovation in Fashion 2020

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Contents

Welcome	4
1 Fashion and Innovation Landscape	5
1.1 US Fashion Industry	5
1.2 Sustainable Fashion	6
1.3 Innovation	7
2 Summary of Stakeholder Meetings	9
2.1 Government Agencies	9
2.1.1 Local: New York City Economic Development Corporation (NYCEDC)	9
2.1.2 International: United Nations	9
2.2 Academic Institutions	10
2.2.1 Fashion Institute of Technology (FIT)	10
2.2.2 Parsons School of Design	11
2.2.3 Rhode Island School of Design	12
2.3 Fashion Trade Association	12
2.3.1 The Council of Fashion Designer Of America	12
2.4 Fashion Businesses	13
2.4.1 EON	13
2.4.2 Fabscrap	14
2.4.3 Global Fashion Exchange	14
2.4.4 Make It Black	14
2.4.5 Mara Hoffman	14
2.4.6 Queen of Raw	15
2.4.7 Sundar	15
2.4.8 Zero Waste Daniel	15
2.5 Innovation Investment Community	16
2.5.1 Accelerator: Fashion Technology Lab	16
2.6 Investor	17
2.6.1 Closed Loop Partners	17
3 Observations of the US Fashion Industry’s Technology and Sustainability Development	19
3.1 Environmental Protection	19
3.2 Environmental Policy	19
3.3 Innovation Funding	20
3.4 Infrastructure Investment	20
3.5 Workforce Development	20
3.6 Technology Innovation	20
3.7 Academic R&D	21
4. Conclusion	22
Annex 1 – List of UK Participants	24
Annex 2 – List of US Stakeholders	25

Welcome

Innovate UK’s Global Expert Missions is one of its most important tools to support the UK’s Industrial Strategy’s ambition for the UK to be the international partner of choice for science and innovation. Global collaborations are crucial in meeting the Industrial Strategy’s Grand Challenges and will be further supported by the launch of a new International Research and Innovation Strategy.

Innovate UK’s Global Expert Missions, led by Innovate UK’s Knowledge Transfer Network, play an important role in building strategic partnerships, providing deep insight into the opportunities for UK innovation and shaping future programmes.

This report provides the findings from a Global Expert Mission on the US fashion industry’s business, innovation and educational priorities in relation to sustainability areas. The mission travelled to the US between 28 October and 1 November 2019, visiting New York City and Providence, Rhode Island. During the mission, delegates engaged with New York City-based stakeholders, as the city is one of the global fashion industry’s major hubs.

The mission was organised and led by Innovate UK, The Knowledge Transfer Network, The British Fashion Council and the UK Department for International Trade.

This report summarises the information and insights gathered during the mission.

UK MISSION DELEGATES	KEY US STAKEHOLDERS
Ahluwalia Studio Ananas Anam Arts and Humanities Research Council British Fashion Council Common Objective Innovate UK Knowledge Transfer Network Pilio UK Department of International Trade University of Leeds/Future Fashion Factory	<p>Government agency stakeholders New York City Economic Development Corporation (NYCEDC) UN Sustainable Development Goals team & Conscious Fashion Campaign</p> <p>Academic institution stakeholders Fashion Institute for Technology Parsons School of Design Rhode Island School of Design</p> <p>Fashion industry stakeholders Closed Loop Council of Fashion Designers of America (CFDA) EON Julie Gilhart Consulting Make It Black Mara Hoffman NeueHouse New York Fashion Tech Lab Queen of Raw STUDY New York Tomorrow London Zero Waste Daniel</p>

1. Fashion and Innovation Landscape

The fashion industry is important to the UK economy, contributing £32 billion (\$42 billion) annually and employing around 890,000 people (BFC 2018-19 Annual Report). The national government's Industrial Strategy aims to increase productivity, generate good jobs and boost earning power for people right across the country, while also committing to protect the climate and environment upon which present and future generations depend. To support this agenda, the UK government has set out its Clean Growth Strategy to grow the national income, while and meet international commitments to significantly reduce greenhouse gas emissions. The strategy estimates a quarter of reductions will be achieved through improving industry and business efficiency¹.

Therefore, Innovate UK has identified the UK fashion industry as a priority sector to help catalyse business models and solutions that both advance the economic potential of the sector and address environmental sustainability challenges. However, given the global nature of the fashion industry, many of the sustainability challenges of the industry will require knowledge exchange and a collaborative approach. For this reason, the mission was tasked with exploring what is happening in the US fashion industry and developing opportunities for working together for mutual benefit.

1.1 US Fashion Industry

The global apparel market is valued at \$2.5 trillion and estimated to employ approximately 75 million people, making it one of the largest industries in the world, with the UK

market representing the largest national market globally.² According to projections, the US apparel market is expected to grow from \$225 billion in 2012 to \$385 billion in 2025³. In 2016 store-based retailing was valued at approximately \$292 billion⁴ and e-commerce retailing at \$68 billion US dollars in 2017.⁵

In 2017, American consumers purchased more than \$136.8 billion in apparel from abroad, while American apparel manufacturers exported nearly \$10.5 billion, resulting in a trade deficit of \$126.3 billion. More than a third of these imports came from China (43.4%), with Vietnam (13.2%), India (5.1%), Indonesia (4.9%) and Bangladesh (4%), rounding out the top five countries of origin.⁶

The US fashion industry employs 1.8 million people.

Area	Number of jobs	Average wage
Fashion designers	19,000	\$79K
Manufacturing	123,000	\$37K
Wholesale	147,000	\$56K
Retail	1.4 million	\$29K
Total	1.8 million jobs	

Source: Bureau of Labor Statistics, Occupational Employment Statistics for NAICS 315000, 424300 and 448000 (March 2018)

¹ <https://www.gov.uk/government/publications/clean-growth-strategy>

² <https://www.statista.com/statistics/197644/annual-clothing-store-sales-in-the-us-since-1992/>

³ <https://www.statista.com/statistics/197644/annual-clothing-store-sales-in-the-us-since-1992/>

⁴ <https://www.statista.com/topics/965/apparel-market-in-the-us/>

⁵ <https://www.statista.com/statistics/736612/fashion-e-commerce-market-usa/>

⁶ https://www.jec.senate.gov/public/_cache/files/39201d61-aec8-4458-80e8-2fe26ee8a31e/economic-impact-of-the-fashion-industry.pdf

It is anticipated that the future of the US fashion industry lies in the high-value-added parts of the global supply chain, and there are signs that companies may be bringing back production activity. Between 2010 and 2017, apparel was the third-largest re-shoring industry in the manufacturing sector, with 952 apparel companies moving production back to the United States.⁷ The re-shoring and near-shoring trend is not only being shaped by consumer demand for short time scales, but also because of advances in material science and manufacturing technology. For example, manufacturers are now testing automated sewing machines that require no human labour. Athletic footwear that requires only two types of material, a single factory to produce them, and a reduction in manufacturing time from months to days, is currently available in retail outlets across the US. Body scanning and 3-D printing of seamless knitwear garments that require no post-production labour are now becoming a reality.

New York City, in particular, is a global fashion power. More fashion designers work in New York City than anywhere else in the country, and the metro area accounts for more than one in three of the nearly 19,000 fashion designers working in the United States. In 2017, New York City's fashion industry employed 4.6% of the total private-sector workforce and generated more than \$11.3 billion in wages and \$3.2 billion in tax revenue. New York Fashion Week had a greater annual economic impact (\$600 million) than the Super Bowl (\$347 million) and generated more income than its rivals London, Paris, and Milan, combined.⁸

Business of Fashion and McKinsey & Company's 2019 State of Fashion Report says: "Regardless of size and segment, players now need to be nimble, think digital-first and achieve ever-faster speed to market. They need to take an active stance on social issues, satisfy consumer demands for ultra-transparency and sustainability, and, most importantly, have the courage to 'self-disrupt' their own identity and the sources of their old success in order to realise these changes and win new generations of customers."⁹ The McKinsey Global Fashion Index predicts the global fashion industry to have grown 4-5% in 2018. The report says fashion players are using words such as "changing", "digital", and "fast" to describe the nature of the industry, and players are proactively looking for opportunities rather than focusing on challenges ahead.

1.2 Sustainable Fashion

As the world's population increases to a projected 8.5 billion people by 2030, annual global apparel consumption could rise by 63%, from 62 million tonnes today to 102 million tonnes. This is equivalent to more than 500 billion additional T-shirts¹⁰. The British Fashion Council and DHL's 2019 White Paper on Fashion and Environment notes: "For the fashion industry to have a response commensurate with global environmental challenges, it will require a systems-level change and development of a new fashion system based in a sustainability paradigm. Bringing about this change is complex given the global nature of the industry and its many different parts. However, a transformation of the fashion industry, addressing its environmental impacts, has been signalled, and these approaches and innovations need to be scaled outwards and upwards."¹¹

According to a lifecycle study by Quantis (2018), the environmental impact of the global apparel and footwear industries combined contributes 8% of the world's greenhouse gas emissions. More than 50% of emissions come from three of the seven production stages: dyeing and finishing; yarn preparation; and fibre production. With global manufacturing concentrated in Asia, greenhouse gas emissions in these stages are driven by apparel production's two stages: manufacturing; and raw material extraction. Reducing these climate impacts will require maximising energy efficiency, shifting to renewables, digitalisation and new consumption models, and designing apparel and footwear with low impact and/or recycling fibres.¹²

The Ellen MacArthur Foundation's A New Textile Economy report (2017) estimates that textile production, of which over 60% is destined for clothing, is responsible for 1.2 billion tonnes of carbon dioxide emissions each year – more than maritime shipping and international flights combined. It says the textile industry alone uses nearly 26.4 trillion gallons of water (enough to support 5 million people). Furthermore, half a million tonnes of microfibres from clothing are leaking into our oceans each year.¹³

The report argues that the fast fashion model, whereby designs move swiftly from runway to stores, is considered a major contributor to these problems. Fuelled by social media, consumers want to get hold of the latest trends as quickly as

⁷ https://www.jec.senate.gov/public/_cache/files/39201d61-aec8-4458-80e8-2fe26ee8a31e/economic-impact-of-the-fashion-industry.pdf

⁸ https://www.jec.senate.gov/public/_cache/files/39201d61-aec8-4458-80e8-2fe26ee8a31e/economic-impact-of-the-fashion-industry.pdf

⁹ <https://www.mckinsey.com/-/media/McKinsey/Industries/Retail/Our%20Insights/The%20State%20of%20Fashion%202019%20A%20Year%20of%20awakening/The-State-of-Fashion-2019-final.ashx>

¹⁰ UK Parliament, 2019. Fixing fashion: Clothing consumption and sustainability. <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1952/full-report.html>

¹¹ <https://www.britishfashioncouncil.co.uk/uploads/files/1/NEW%20Fashion%20and%20Environment%20White%20Paper.pdf>

¹² <https://quantis-intl.com/measuring-fashion-report-2018/>

¹³ A New Textiles Economy 2017, Ellen Macarthur Foundation https://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report.pdf

possible, and retailers rapidly increase production to meet short-term demand. The consequence is overproduction and large amounts of waste — fashion retailer H&M, for example, reported a global inventory of unsold clothes worth \$4 billion in 2018. In 2017, British luxury fashion label Burberry burned £28.6 million (around \$37 million) worth of unsold bags, clothes, and perfume. Furthermore, after use, 73% of clothes either end up in landfills or are incinerated.

The fashion world is starting to take steps to lessen its negative impact on the environment, especially as consumer demand grows for more sustainable products and practices. The 2018 Sustainable Fashion Blueprint Report produced by e-commerce marketplace Mamoq, reviews the sustainability initiatives currently being implemented, and offers a framework that fashion businesses can follow in their efforts to reduce their negative environmental and social impacts¹⁴. The report reveals that consumers place sustainability as their fourth most important criteria when purchasing fashion (57%). The three main barriers preventing consumers from purchasing sustainable fashion according to the report were: lack of knowledge and visibility of sustainable clothing, the high price attached to sustainable fashion and “limited” style.

Consumers in the US and worldwide are growing increasingly aware of the fashion industry’s environmental impact, and there is a fast-growing market for sustainable apparel. Research published in 2019 by Natalie Kaucic and Dr Sheny Lu from the University of Delaware, indicates that the sustainable apparel market has experienced rapid global growth from 2016 to 2019. The number of sustainable apparel items available worldwide surged from 58,144 stock keeping units (SKUs) in 2016 to 353,817 SKUs in 2018, up a staggering 508%, indicating retailers’ and consumers’ increased enthusiasm¹⁵.

As shown above, the US is the world’s top market for sustainable apparel as measured by the number of SKUs sold. Notably, except for China, all top markets are located in high-income countries, particularly in the US and Western Europe, suggesting a close relationship between consumer purchasing power and demand for sustainable apparel products. Furthermore, the results show that retailers are adopting a range of communication strategies for their sustainable apparel products, for example, some emphasise the use of specialised eco-friendly dyes or fabric compositions (such as organic cotton or Tencel) for their products. Others highlight that their sustainable products

Table 1: Top sustainable apparel markets in the world (2016-2018)

Area	Number of sustainable apparel products available (SKUs)	Market share
USA	306,455	19.9%
Germany	157,078	10.2%
UK	93,939	6.1%
France	61,599	4.0%
China	58,519	3.8%
Italy	53,899	3.5%
Sweden	50,819	3.3%
Austria	47,739	3.1%

Source: Edited 2019

are certified by well-known third-party organisations such as BlueSign, Fairtrade and B-Corp. Additionally, whilst the common perception is that larger companies, in general, have more resources to contribute to sustainability, research shows that small and medium-sized (SME) fashion retailers demonstrate more enthusiasm for selling sustainable apparel.

In most markets around the world, retailers prioritise sustainable apparel for womenswear, which accounts for more than 60% of the total sustainable apparel items available. This echoes previous studies that suggest women purchase more clothing than men and are more conscious of sustainability when shopping.

Natalie Kaucic and Dr Sheny Lu’s research finds in most countries, sustainable apparel tends to be priced relatively higher than regular apparel, which is a barrier to consumers. This higher retail price is the result of a mix of factors, including more expensive raw materials like organic cotton, higher marketing spends on advertising and promotion as well as consumers’ decreased price sensitivity towards sustainable apparel items. Furthermore, fashion retailers in most markets around the world tend to offer fewer discounts for sustainable apparel than regular clothing items.

1.3 Innovation

Research and development (R&D) in the United States is funded and performed by a number of sectors, namely: the federal government, state governments, businesses, academia and non-profit organisations.

¹⁴ <https://mamoq.com/blogs/the-journal/sustainable-fashion-blueprint-2018>

¹⁵ https://www.just-style.com/analysis/a-deep-dive-into-the-global-market-for-sustainable-apparel_id136210.aspx

The United States became a global leader in R&D in the twentieth century, funding as much as 69% of annual global R&D in the period following the second world war.¹⁶ Two sectors — industry and the federal government — have together accounted for more than 90% of US R&D funding since 1953, though their combined share had fallen from a high of 98% in 1956 to 91% in 2016.

In 2000, business accounted for 69.4% of US R&D expenditure and the federal government 25.1%. This shift in the composition of the R&D funding resulted not from a reduction in federal government R&D expenditures, but rather from faster growth in industry R&D expenditures.

From 2000 to 2010, business R&D's share declined from 69.4% to 60.0% and has risen each year since, reaching 69.0% in 2016. In contrast, federal R&D has declined seven straight years, from 2009 to 2016 by a total of \$22.8 billion (17.2%).

In 2018, Federal R&D spending was 0.61% of GDP, which is the lowest level since 1955 according to the latest data from the National Science Foundation.¹⁷

In 2017, businesses in the United States invested the equivalent of 1.94% of GDP in R&D (approximately \$458 billion). In 17 of the 27 years following 1990, industry R&D rose as a share of GDP, with declines occurring after 1991, 2000, and 2008 in the wake of recessions. However, most of this increase is in later stage “development” and not in riskier basic and applied research.¹⁸

In 2016, US business enterprise R&D expenditure in the manufacture of textiles, wearing apparel, leather and related products was close to \$1.2 billion. In the information and communications sector business enterprise R&D expenditure is computer programming, consultancy and related services was 15.7 billion.¹⁹

¹⁶ <https://fas.org/sgp/crs/misc/R44307.pdf>

¹⁷ <https://itif.org/publications/2019/08/12/federal-support-rd-continues-its-ignominious-slide>

¹⁸ <https://itif.org/publications/2019/08/12/federal-support-rd-continues-its-ignominious-slide>

¹⁹ https://stats.oecd.org/Index.aspx?DataSetCode=BERD_INDU

2. Summary of Stakeholder Meetings

Over the course of one week the mission delegation met with government agencies, education institutions, the fashion trade association, fashion businesses and the innovation investor community.

2.1 Government Agencies

2.1.1 Local: New York City Economic Development Corporation (NYCEDC)

New York City Economic Development Corporation (NYCEDC)²⁰ is a government agency that has a programme to support the local fashion industry through creative and applied technology initiatives. The programme has a strong focus on design and manufacturing infrastructure and workforce development.

They offer support to fashion manufacturing businesses through:

- Grant funding also focused on assisting businesses to purchase new/cutting-edge manufacturing equipment to drive their international competitiveness.
- SME and microbusiness grant support aimed at ensuring the textile/fashion manufacturing base is able to accelerate workforce development (including attracting new talent).

They have invested in the development of new districts within New York City, based on co-location of fashion design and textile manufacturing companies in large sites, e.g. Brooklyn Army Terminal, which will be able to house 100 manufacturers over a 55-acre site. The provision of affordable rent in these locations helps small fashion manufacturing businesses to develop and grow.

There are 1,600 fashion manufacturers in NYC. There is a move towards small batch, high value, short-run, agile manufacturing, or point-of-demand manufacture (see Fashion Inc) within the city. NYC has the tailoring industry, full garment knitwear manufacturers as well as on-demand manufacturers creating opportunities for integrating online e-commerce platform with direct production. This model could be replicated further in the UK, connecting into the UK fabric and garment manufacturing base, which is distributed across the UK, especially in the North of England.

Regulation around the production of waste is not as strong in the USA as it is in the UK, which affects the degree of innovation in sustainability, compared to the UK. Regulation is strongest in California.

New regulations are coming into NYC to drive circular economies, which sets the scene for further growth of the e-platform. There is a white paper in development to change the law in NYC to incentivise circular economy activities.

NYCEDC supports the creation of a new “Made in New York City” brand to promote provenance (attached to all fashion products where 75% of the product is made in NYC). Similar schemes exist in Prato, Italy and Yorkshire, UK.

2.1.2 International: United Nations

The United Nations (UN)²¹ is making its 75th Anniversary in 2020 and wants to embrace innovation as the way forward. One of the UN’s key objectives is promoting the 17 Sustainable Development Goals, which nation-state members have committed to meet by 2030.²²

The Expert Mission met with a member of the UN Global Compact team as they work specifically with businesses to uphold ten universal principles, including the Sustainable Development Goals (SDGs). The Sustainable Development Goal compass tool advises companies on how to take action. So far, eighty-seven companies have signed up to the Science-Based Targets initiative (SBTi) to limit global warming to 1.5°C degrees, including Burberry.

The UN Fashion Alliance is an interagency working group launched in early 2019. The purpose of the Alliance is to build a global understanding of who is doing what in the sustainability area. They want to help the fashion industry shape the future and have outlined how each of their partner agencies could contribute.

²⁰ <https://edc.nyc>

²¹ <https://www.un.org>

²² <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>



The UK delegation meeting with the United Nations.

The Conscience Fashion Campaign, in collaboration with the United Nations Office for Partnerships, engages global industry events to commit to the achievement of the Sustainable Development Goals. The initiative champions fashion as an influential sector to address the world’s most pressing issues and lead a future that leaves no-one behind. The campaign is dedicated to driving change through advocacy, education and engagement of industry stakeholders to create a sustainable future for all.

One-X-One is a pilot initiative which has scientific experts working directly with fashion designers and is funded by Swarovski²³.

Following this meeting the British Fashion Council announced a partnership with the United Nation Office of Partnerships to promote the Sustainable Development Goals in the fashion sector. This was initiated at The Fashion Awards 2019, where the UN sponsored a new award for Positive Change – won by the signatories of The Fashion Industry Charter for Climate Action²⁴.

2.2 Academic Institutions

2.2.1 Fashion Institute of Technology (FIT)

The Fashion Institute of Technology (FIT)²⁵ is a public college in Manhattan, New York City. It is part of the State University of New York (SUNY) and focuses on art, business, design, mass communication, and technology connected to the fashion industry. The shorthand of the institute’s ethos is “when creativity gets down to business”. FIT offers more than 40

degree-level programmes across a diverse range of creative disciplines. It has approximately 7,400 full-time students, and 1,300 part-time students enrolled at any one time. FIT’s primary focus is teaching rather than being research-led. The mission of the schools is to prepare students for professional excellence in design and business through rigorous and adaptable academic programmes, experiential learning, and innovative partnerships. FIT has three major goals: to provide academic and creative excellence; to develop the Innovation Center, and to empower the student community.

FIT’s recently opened Innovation Center most directly aligns with the research and innovation objectives of AHRC and Innovate UK to support and stimulate business and research responses to address the sustainability challenges of the fashion industry. This is because the Center aims to work with creative industries worldwide to help address key challenges, to build a strong culture of innovation and entrepreneurship at FIT and to establish collaborations that translate creative ideas into action.

The Center values a multi- and inter-disciplinary approach for exploring innovation needs and priorities in fashion. The Center takes a project approach assembling scientists, designers and technologists to investigate and develop innovations that address a challenge in the fashion industry. There are currently 50 projects by 80 students. Project examples shared in the meeting included growing fibres, conductive yarns, biodegradable footwear, augmented and virtual reality technologies as well as on-demand

²³ https://www.swarovskigroup.com/S/news/One_X_One.en.html

²⁴ <https://unfccc.int/climate-action/sectoral-engagement/global-climate-action-in-fashion/about-the-fashion-industry-charter-for-climate-action>

²⁵ <https://www.fitnyc.edu>

manufacturing. These areas are highly aligned to the thinking within the fashion industry about its future development.

FIT has collaborations in Milan, Italy and Korea (where they have a campus). They also have collaborations with UK universities; Manchester and Birmingham. During the meeting, FIT also highlighted their active collaboration with the Massachusetts Institute of Technology (MIT) – particularly in the area of future textiles and fabrics. FIT is focused on making things real from the fundamental MIT research rather than leading the technology development in-house.

During the meeting with FIT, it became apparent that the innovation funding landscape in NYC is very different to the UK; innovation programmes are funded through the support of corporate partnerships rather than through government-funded competitive grants. FIT's industry partnerships include IBM, Adidas and Tommy Hilfiger and The Girl Scouts of America.

2.2.2 Parsons School of Design

Parsons School of Design²⁶ aims to enable students to develop their knowledge and skills to succeed in a rapidly changing society. It is a private art and design college. Students collaborate with peers throughout The New School, industry partners, and communities around the world and in New York City. Parsons has a large interdisciplinary faculty. Parsons has had many successful alumni including Tom Ford, Donna Karen and Michael Kors.

Parsons has a conceptual-based education approach to design, and the School encourages forward-thinking around the role of future designers. Parsons is not training students to respond to the current fashion industry needs directly, but to think actively about the role and impact of design on society. The School is thinking about what being a modern designer means in the twenty-first century. For example, they are currently exploring the role of design with an ageing population; how technology is changing the industry and what innovation is needed in materials. The role technology plays in society is of interest to students – both enabling forces for prosperity, but also its adverse impacts.

Parsons students are exposed to the full value chain from artisans, fabric suppliers and manufacturers to brands and retailers.

Their approach to sustainability is to have it embedded across the curriculum rather than offering specific sustainability design and fashion courses. Furthermore, the term sustainability is not explicitly used in courses.

It has a very student-led research and development ethos rather than the academic staff leading research programmes that students can join. Furthermore, student projects are not led by industry challenges. The faculty described the interests of students to provide novel thinking, and it is for this fresh thinking that industry partners run collaboration projects. The faculty said that their students prefer to develop new ideas rather than focus on fixing the problems within the existing system. The ideas developed by students are very early stage and therefore need more development to be progressed into commercially-viable innovations that would be financed and adopted by businesses.

There is extensive engagement with international partners, especially in China, and half of the fashion students at Parsons are from overseas, most notably Asia. They are opening a new campus in China. Approximately 50 Parson students go to Central Saint Martins each year as part of their education.

Parson graduates are sought out by non-fashion businesses as companies value the design thinking and training their students can bring to their businesses. Their students are in high demand by technology companies. Graduates are also interested in going into the non-profit sector where organisations are looking to meet some of the most pressing social and environmental challenges society face.

Parsons has a wide number of industry collaborations – one such example is with Macys, which is a programme exploring human, societal, demographic and regional impacts of design.

The Parsons ELab²⁷ runs a 12-Month Incubator each calendar year with applications opening in the Autumn (Fall). The Incubator places Fellows at partnership spaces distributed around the city, immersing the Fellows into the New York City design and entrepreneurial ecosystem. These co-working spaces grant Fellows space to work, conduct meetings, and grow their businesses, leveraging resources offered through ELab and each respective space.

XRC Labs²⁸ is an innovation accelerator for the next generation of disruptors in the retail technology and consumer goods sectors. The mission is to foster companies and products that innovate the face of retail and consumer goods fulfilment in a rapidly changing marketplace using design thinking as a key driving process. The XRC Labs vision is to be at the forefront of change, disrupting the conventional system of supply chain, promoting the best experience for consumers and producers, and creating an ecosystem that matches partners for success. The XRC Lab principles include:

²⁶ <https://www.newschool.edu/parsons/>

²⁷ <http://sds.parsons.edu/elab/about-2/the-incubator/>

²⁸ <https://www.xrclabs.com>

embracing environmental sustainability; advocating moderate consumption; endorse economic wellbeing that fosters global improvement in the economic conditions of people; demand integrity, honesty and fairness in relationships; recognise and nurture excellence in people, technology and products; mentor the next generation of innovators; share and exchange ideas in an open forum; and encourage solutions from multiple sectors applied to retails and consumer products.

The New School²⁹ is a progressive university with its main campus in New York City. The university houses: Parsons School of Design, Eugene Lang College of Liberal Arts, the College of Performing Arts, The New School for Social Research, the Schools of Public Engagement, and Parsons Paris. Students collaborate across disciplines and learn new ways of creative problem solving to effect positive change in the world. The New School offers the Impact Entrepreneurship Initiative, which is designed to support graduate students and upper-level undergraduates in developing financially sustainable ventures that address critical societal challenges and demonstrate the potential for scalable impact.

2.2.3 Rhode Island School of Design

Rhode Island School of Design³⁰ is a leading design school in Providence, Rhode Island with around 2,000 undergraduates and 500 masters students enrolled at any one time. The School's priority is to produce "critical makers" from across the design and fine arts disciplines. There is a strong emphasis on developing hands-on practical skills. All students take a core set of courses to lay the foundation before selecting the area they want to focus on for their degree major. Design students are given a strong grounding in textiles and fabrics, which connects to the history of the School, which was founded by textile industrialists.

The School is fostering consideration of environmental and social sustainability issues. The School discussed their commitment to developing a student experience that encourages:

- participation in creating a more just society
- exploration of sustainability for all
- new ways of making and knowing.

The School is a very nurturing environment for students to develop ideas and skills in design and art. The focus is on training students in craft techniques; therefore, students are taught to think and design as artisans. The curriculum does not cover in-depth the business and supply chain side of the fashion industry.

Environmental sustainability is embedded across courses and within the faculties rather than treated as a thematic. Students are taught traditional and digital textile techniques. The curriculum balances technology and creativity to ensure students gain good technical training in textiles. We were shown their natural history facilities and biomaterials lab where students study and explore themes of nature, sustainability and culture.

The School offers students overseas learning opportunities in countries around the world – examples shared were in Portugal and Morocco.

The School does not have a doctorate programme and there is not a focus on faculty-led research.

There is a deep engagement and relationship between students, alumni and industry. The School tracks the progress of former students and provides ongoing mentorship.

2.3 Fashion Trade Association

2.3.1 The Council of Fashion Designer of America

The Council of Fashion Designers of America (CFDA)³¹ is a not-for-profit trade association, founded in 1962, whose membership consists of more than 500 of America's foremost womenswear, menswear, jewellery and accessory designers. In addition to hosting the annual CFDA Fashion Awards, the trade organisation owns the Fashion Calendar and stages New York Fashion Week: Men's and Women's. CFDA has a database of about 400 (designers, colleges, 70 brands etc).

CFDA has developed a growing resource set including:

- Guide to Sustainable Strategies
- Tool Kit for Sustainable Strategies
- Quick Wins guide
- KPI Tool Kit
- Guide to Certification
- Materials Index.

They are developing a toolkit for sustainable fashion. Considerable sustainability information is being gathered, but there are challenges in making sure designers can use it for decision-making. Developing a materials toolkit was considered important to help designers navigate the area. There is also a lot of attention on conducting a mapping exercise, on who is doing what in the sustainability space and mapping out the opportunities, gaps and needs. Professionals are seeking guidance on what to do, backed by an evidence base on the options and trade-offs in sustainability.

²⁹ <https://www.newschool.edu>

³⁰ <https://www.risd.edu>

³¹ <https://cfda.com>



Rhode Island School of Design

CFDA provides small grants to US-based designers; we discovered that these were lower scale compared to the funding available in the UK. The delegation agreed that micro-funding and grants are important in supporting designers to develop their ideas and business. Funding can help motivate designers to be more progressive. It became apparent that there is more early stage and small business funding support in the UK compared to the USA. This is an area of differentiation between the UK and the US.

2.4 Fashion Businesses

2.4.1 EON

EON³² is an environmental data analytics company for the fashion industry. They have developed a system for individual garments to have a unique ID (UID) which allows access to details about the fibre composition, history and other information via the cloud. A physical radio-frequency identification (RFID) tracker is embedded in the fabric that stays with the garment through its life. We were shown an RFID tag that looks like a coarse filament (resin-coated filament that is flexible) and embedded in the garment, e.g. sandwiched inside the fabric at the top of the jeans (not like a label).

At present brands use RFID to identify products and assist with logistics but remove it at the point of sale. The digital identity of the garment needs to continue beyond the point

of sale, so the chemical composition, fibre content etc can be easily determined by scanning devices by the brand's supply chain partners and remains through to the end of the garment's life. Then the digital UID can assist with the sorting of the garment, recycling and re-use.

Currently retailers cannot easily share product data with other partners, digitally via the cloud. EON's technology will help retailers drive rental models, take-back schemes and recycling schemes etc. All the information that goes on the physical label is already public source and allows physical blockchain.

EON is focused on developing the software, using the Internet of Things, but not on the hardware (scanning technology). They are launching in 2020 with of all the information that is needed to track, resell and recycle garments. EON will hold the digital product data in the cloud and then can also conduct analytics on the data.

They are developing the software, and are hardware agnostic i.e. they can connect to RFID, QR codes etc, or whatever comes in the future. The system supports the management of transport, logistics and movement of items based on a UID to enable all the information of the product to be immediately available. The identification of garments will create potential for producer responsibility to end-of-garment life. They are creating RFIDs linked to shopping applications.

They are putting the intellectual property into a non-profit,

³² <https://www.eongroup.co>

so the protocol will be licensed to people who want to use it. There is no opportunity to protect intellectual property - like UBER, it's being first that matters.

All their funding has come from external investment not grants. In the US there seems to be much more investment funding available; progress is less reliant on government grants. The founder comes from an environmental science and technology background. To build the business she invested from the share sales of a previous start-up.

2.4.2 Fabscrap

Fabscrap³³ is a not-for-profit platform aiming to help tackle the textile waste problem by enabling the re-purpose, re-use and recycle of textiles. Fabscrap says New York City residents throw out 200,000 tonnes of clothing, shoes, accessories, and linens every year. Textiles comprise 6% of the City's total waste stream. Residential waste - material that has been used and discarded by an individual or family - is picked up by the Department of Sanitation. Commercial textile waste is picked up by private carters. There are few, if any, reporting requirements and enforcement of recycling regulations is lacking. Therefore, it's extremely difficult to quantify and characterise commercial waste. The best estimate is that it is at least forty times residential waste³⁴.

Fabscrap has developed a service for collecting, processing, consolidating, recycling and reusing fabric scraps from across the New York City metropolitan area. Businesses register and organise pick-ups of their textiles. Fabscrap charges a service fee which covers operational costs and allows them to give fabric to students, artists, local designers, and crafters for reuse. Rather than receiving a tax receipt for the value of the donation, the service fee is tax-deductible.

2.4.3 Global Fashion Exchange

Global Fashion Exchange (GFX)³⁵ is an international platform and consultancy promoting sustainability in the fashion industry with forums, educational content and cultural events. GFX aims to empower brands and consumers to take action for a better environment. They began with a single cloth swap and this led to a global network of change-makers. They work to build communities, to help brands get on the right track and to create roadmaps that catalyse positive change.

2.4.4 Make It Black

Make It Black³⁶ is a company developing an innovative blackout colour technology: Advanced Remanufacturing to transform clothing into new. The founder has developed a bespoke environmentally-friendly recipe with academics at

Cornell University to dye garments. The innovation is at the proof-of-concept stage with trials running with brands. The founder received a National Science Foundation Innovation Corps (I-Corps)³⁷ grant to enable collaboration with Cornell University academics. The I-Corps programme helps to accelerate research toward commercialisation and fosters collaboration between academia and industry.

2.4.5 Mara Hoffman

Mara Hoffman³⁸ is an established womenswear design company with 20 years of experience, and five years ago they put social and environmental sustainability at the heart of the company's ethos. The team at Mara Hoffman are actively working to develop a partnership business model to accelerate the peer sharing and adoption of good social and environmental business practices.

They primarily have a direct business-to-consumer model. They are moving to owning more of their supply chain and using a retail setting to tell their story.

The business is solely-owned and, therefore, they do not have to adopt a growth strategy to meet shareholders expectations.

Examples of their sustainability initiatives include:

- Collaboration with a company in the USA that take-back their products and repair them for re-sale.
- Development of circular economy initiatives based on new models e.g. re-selling and rental platforms.
- Workforce development and collaborations that can assist in their delivery, e.g. initiative to work with former prisoners, and underprivileged groups, including upskilling.
- Planning lateral, not vertical growth, based on consuming less virgin material.
- They are re-approaching their supply chain from design, material sourcing, manufacture and retailing as concerned with ethical and environmental practices to ensure transparency.
- Developing "custom collaborative" – small cooperative factory, employing mostly immigrant women, but teaching them business skills, and helping them to produce products.

³³ <https://fabscrap.org>

³⁴ <http://storyofstuff.org>

³⁵ <http://www.globalfashionexchange.org>

³⁶ <http://www.makeitblack.com>

³⁷ https://www.nsf.gov/news/special_reports/i-corps/

³⁸ <https://www.marahoffman.com>

2.4.6 Queen of Raw

Queen of Raw³⁹ is a fashion technology company that has created a global e-sales software platform marketing deadstock fabric from local and international manufacturers. They are exploiting the supply/demand mismatch as the overall value of the global textile business is \$1,200 billion and 15% of this is waste. The company applies a blockchain methodology to the traceability of fabrics. The revenue model is based on commission-per-sale. It is a for-profit company with a social mission.

All inventory is held in the same location it was made, which leads to low overheads. It allows purchasers to find deadstock, which is available locally to them, or to source internationally, as necessary. It replicates the model that originally made the fashion industry successful in New York, i.e. find fabrics nearby, make products and sell it locally – this model was the original one on which the textile industry in the USA was built.

The e-platform tells the user where the fabric inventory is located, and therefore can source locally or internationally. They use fast fashion, luxury fabric and raw material sources (not just scraps but lengths of fabrics). The model exploits supply chain waste and inefficiencies as 10-35% (15% average) is waste at each step of the production process. It is estimated 120 billion dollars of waste fabric globally sits in warehouses not being used.

The e-platform is open (there is no joining fee and searching the inventory is free) and has 100,000 registered users to date. The platform also manages shipping, sales etc, so it is convenient and easy for the vendor and buyer. There are no minimum order quantities which is great for fashion start-up businesses needing materials. The e-platform uses machine learning to match stock to potential customers.

If the vendor has an inventory management system (CSV files) they can integrate with the e-platform or provide an alternative system to access the inventory information that is held – identifying who owns the inventory, the factory or the retail blend.

Growth is continuing by increasing inventory available from China and other major global production areas. One issue for Queen of Raw is understanding the ethical situation with manufacturers who provide deadstock (they can collaborate with Sourcemap⁴⁰ to crosscheck this).

They are partnering with MIT on data analytics. Still, they are interested in working with UK agencies on technology

and working with UK companies to generate revenue/reduce waste costs of vendors.

They are looking to incorporate the Higg Index (a measure of the eco-credentials of different fibres, based on fibre-to-gate calculation). Queen of Raw is working with Fabscrap (listed previously), Terra-cycle⁴¹ and Thread-up⁴² as they are gathering data on fabrics. In the future, Queen of Raw could extend their platform to process post-consumer garments.

2.4.7 Sundar

Sundar⁴³ is a fashion technology business building a discovery and sourcing platform connecting fashion brands with manufacturers and suppliers of textiles, trims, components and specialist services. The goal of Sundar is to aid in the promotion and development of faster and safer methods for products to be made by a highly-skilled workforce. Sundar aims to do this by transforming the fashion supply chain through facilitating creativity, transparency, productivity and profitability.

All vendors appearing on the software platform have completed a sourcing questionnaire with support from the Sundar team. The questionnaire requests information on operational, financial, product and service criteria and also on social and environmental compliance information and credentials (third party certificates are shared). By signing up with Sundar, suppliers agree to comply with the Sundar Code of Conduct. The Code of Conduct: no child labour, forced labour; no coercion or harassment; no discrimination; free of association; health and safety; wages; work hours; and environmental protection. Facilities will comply with laws and regulations in all locations where they conduct business. Sundar was incubated at MIT and Techstars.

2.4.8 Zero Waste Daniel

Zero Waste Daniel⁴⁴ is an upcycling clothing design company that is turning pre- and post-industrial clothing waste into desirable streetwear. The founder is a trained designer and highly committed to sustainable fashion principles.

They design clothing from waste branded corporate clothing and workwear that is owned by brand-owners and is normally shredded and sent to landfill/incineration to protect the brand/security reasons even though the garment might never have been worn or is in pristine condition. By removing the branding and using these high quality pre-industrial/pre-consumer fabrics (which are free to obtain), Zero Waste Daniel has created a closed-loop model (clothing-to-clothing production model). They have secured licenses from suppliers

³⁹ <https://www.queenofraw.com>

⁴⁰ <https://www.sourcemap.com/blog/2018/10/11/sourcemap-launches-worlds-first-free-digital-map-of-apparel-factories>

⁴¹ <https://www.terracycle.com/en-GB/>

⁴² <https://www.thredup.com>

⁴³ <https://www.sundar.io/pages/about>

⁴³ <https://www.sundar.io/pages/about>

⁴⁴ <http://zerowastedaniel.com>



The UK delegation meeting with Zero Waste Daniel in Brooklyn.

to allow them to work with this branded deadstock. There is potential for Zero Waste Daniel to hold an exclusive license. Because of the large quantity of corporate clothing/workwear waste that exists in the UK and the USA, their model is easy to replicate. High-quality creative design remains at the centre to generate customer willingness to pay for the upcycled designed clothes.

They have bootstrapped the business and are growing organically. They have received funding from an angel investor who retains a stake in the business. They have developed a business model where they sell primarily direct to customers coming into the studio shop and their online store. They are growing the business by building an eco-system of other small businesses, fabric suppliers, garment manufacturers and badge makers that are based locally. Hence, their supply chains are short, agile and locally based. They have also outsourced garment manufacture to avoid the cost of employing staff, insurance and cashflow issues that otherwise stifled their profitability. They have developed a number of corporate collaborations, which has helped balance their cashflow and raise their profile.

2.5 Innovation Investment Community

2.5.1 Accelerator: New York Fashion Tech Lab

New York Fashion Tech Lab⁴⁵ was co-founded in 2014 and is produced by non-profit venture catalyst: Springboard Enterprises. It's an accelerator created by women for women with business innovation for the fashion industry. The Lab started in 2014 and runs a highly-selective annual 12-week programme for a cohort of around eight fashion technology companies. Companies on the accelerator programme receive mentoring and access to a network of retailers and investors. The companies need to have proprietary intellectual property and be well advanced in their business development with technology ready for deployment and scale.

To be eligible for the programme there must be a female founder and/or a female on the senior management team (i.e. the C-suite team). The Accelerator is open to international applications and in 2019, for example, 50% of the cohort were from outside the US. The Lab is funded through a corporate partnership model with about 30 brands from fashion and technology sectors. The partnerships are involved in the selection process.

The technology does not have to be specifically developed for the fashion industry but should have applications for fashion businesses. At the end of the accelerator programme, founders present their solution to 300 brands, investors and retailers.

⁴⁵ <https://nyftlab.com>



The UK delegation meeting with New York Fashion Tech Lab at Spring Place.

The goal of the presentation day is to gain exposure to potential customers and investors. The Lab keeps a database of companies that could be eligible so that they can manage applications.

Retailers are interested in technology that is outside fashion to see what can be used to improve their businesses, for example:

- consumer insight companies
- virtual reality shopping companies
- social media companies
- gamified collection of data for identifying consumer preferences.

Examples of technologies that companies on the Accelerator are developing include:

- a robotic smart mannequin
- a virtual reality shopping platform
- transparency and traceability of materials software platform
- a sustainable materials sourcing software.

EON and Sundar, who the delegation met, are both alumni of the Lab

In addition, Springboard has launched “Springboard Growth Capital” to invest in £20+ million in later stage opportunities as they arise from the NY Fashion Tech alumni.

Accenture and Microsoft are partners who are actively working with NY Fashion Tech to bring the initiative to the UK.

2.6 Investor

2.6.1 Closed Loop Partners

Closed Loop Partners⁴⁶ is a New York-based investment firm comprised of venture capital, growth equity, private equity, project finance and an innovation centre. They invest in the circular economy; a new economic model focused on a profitable and sustainable future.

This economic model is the most significant restructuring of global commerce since the industrial revolution. It is an overhaul of how products are designed, manufactured, sold, refurbished and recycled. It is a framework for global corporations and start-ups alike to reimagine capitalism in order to reduce costs, increase efficiency, and protect the environment we share. It is a platform to amplify opportunities for growth in a natural-resource constrained world.

⁴⁶ <https://www.closedlooppartners.com>

Investors include many of the world's largest consumer goods companies interested in investments that provide strong financial returns and tangible social impact. The firm invests in innovation, businesses and entrepreneurs, which are focused on the triple bottom line of people, planet and profits through a circular economy approach. The fund invests across the sustainability agenda – for example, into plastic recycling infrastructure, new delivery models and cutting-edge material science. Closed Loop Partners has invested in the US, South America, Europe and Israel.

The Closed Loop Venture Fund was created to deploy early-stage capital into companies developing breakthrough solutions for the circular economy. Their portfolio includes companies developing leading innovations in material science, robotics, agritech, sustainable consumer products and advanced technologies that further the circular economy. Since inception, they have worked towards circularity in specific verticals: consumer goods and packaging, fashion and beauty, supply chain optimisation, and food and agriculture.

The Closed Loop Fund was founded in 2014 to finance recycling and circular economy infrastructure across North America. It is funded by the world's largest retailer and consumer goods companies.

At the close of 2019, the Closed Loop Partners portfolio included 45 investments, catalysing \$224 million in co-investment to support circular supply chains and avoiding 3 million tonnes of greenhouse gas emissions.

3. Observations of the US Fashion Industry's Technology and Sustainability Development

From the information gathered from stakeholders, the mission delegates have made a number of observations about the US fashion industry in relation to environmental protection, environmental policy, the funding landscape, infrastructure investment, workforce development, technology innovation and academic R&D.

3.1 Environmental Protection

There was a perception by the stakeholders that the UK is a leader in environmental protection as it has a more progressive environmental policy landscape that is creating the driver for the UK fashion industry to take greater environmental and climate action. Stakeholders thought the UK fashion industry was demonstrating strong environmental leadership – pointing to Stella McCartney, Burberry and Vivienne Westwood as examples of brands showing the way.

Stakeholders discussed some of the seemingly intractable environmental challenges faced by the fashion industry due to systemic failures – plastic packaging was given as a case in point where it is not possible to tackle plastic packaging without a whole systems approach throughout the supply chain from the factory to the wholesaler to the retailer to the customers as there are a complexity of quality, material, regulatory and recycling issues along the supply chain. No one stakeholder in the supply chain can shift to a good practice environmental model without co-ordination and agreement with others in order to have an environmentally-friendly alternative to plastic packaging at scale. Packaging was one area where there is a strong interest for initial collaboration.

At many of the meetings, it was said fashion consumers have an important role in helping to drive the demand for good social and environmental practice. Educating the customer to understand the environmental and social impacts embodied in their fashion choices was viewed as critical to helping catalyse positive action. There was a perception that certain customer segments are demanding greater information and transparency from fashion brands and retailers about their environmental and social credentials, and they will shift their fashion purchasing habitats to those following good practice and/or circular models (e.g. take-back or rental business

models). However, like in the UK, it was recognised that for fashion customers on a tight budget they do not have the luxury of paying a premium for fashion brands adhering to good practice.

3.2 Environmental Policy

There is a commonality between New York (City and State) and the UK governments' climate policy strategy. New York City and State's climate change strategy aligns with the UK government's Clean Growth Strategy and commitment to being net carbon zero by 2050.

In April 2019, Mayor de Blasio launched NYC's Green Deal - OneNYC2050⁴⁷ - the City's long-term strategic plan to confront the climate crisis, achieve equity and strengthen democracy. The City is committed to achieving carbon neutrality by 2050, which they define as a 100% reduction in greenhouse gas emissions and the City raised its greenhouse gas mitigation commitment to achieve an additional 30% reduction by 2030. The City is investing \$20 billion to protect people and strengthen communities, buildings, infrastructure and waterfront to be resilient to climate impacts. Furthermore, the City aims to create thousands of jobs in the green economy. Plus, both New York and London are divesting their pension funds from fossil fuels and investing in the green economy, thereby providing a model for other cities to follow.

Then in June 2019, the New York State Senate passed the Climate Leadership and Community Protection Act to adopt measures to put the state on a path to reduce state-wide greenhouse gas emissions by 85% by 2050 and net-zero emissions in all sectors of the economy. The Act to become law is now in the process of being delivered and signed by the New York State Governor.

⁴⁷ <https://onenyc.cityofnewyork.us>

However, there is a significant divergence between the US and UK climate strategy at the federal level as the US does not have a national greenhouse gas emission reduction strategy and has withdrawn from the Paris Climate Agreement.

This means for the New York fashion industry, which is operating across the US and internationally, there is no coherency in the strategy for reducing greenhouse gas emissions. Furthermore, the climate strategy for New York is new and, therefore, its implications for the fashion industry has not yet filtered through to business planning and decision making. From the conversations had during the mission, stakeholders identified the need for greater environmental and climate literacy so that the fashion industry can respond to policy agendas and embed sustainability through its value chain. It was suggested that knowledge exchange of environmental sustainability solutions and approaches in the fashion industry would be of great benefit to all stakeholders.

In addition, SME fashion businesses said acquiring social and environmental certification is cost-prohibitive and time-consuming. These are the same barriers for SME fashion businesses in the UK to hold social and environmental certifications.

3.3 Innovation Funding

The funding landscape to support fashion innovation in New York and the US more widely is very different to the UK. The stakeholders signposted the delegates to small innovation grant programmes available to US fashion entrepreneurs and companies through CFDA, NYCEDC and the National Science Foundation. Entrepreneurs and fashion businesses innovating in the fashion sustainability space seem to typically self-fund and then raise private capital (from corporate innovation schemes and venture funds) in order to advance the idea and build a business proposition. There are large corporates with interests in fashion and funding sustainability and entrepreneurship, but the amounts are typically small and targeted at solving their specific challenges rather than generating full supply chain or system solutions.

3.4 Infrastructure Investment

The delegation found it very insightful to learn of NYCEDC's infrastructure investment into creating a creative industries manufacturing hub. Creating the physical commercial spaces and providing affordable rents to help retain and encourage fashion businesses to stay in the city was viewed as advantageous for creating good jobs and building its continued status as a national and international fashion hub. The delegation thought the efforts to re-shore manufacturing and respond to the on-demand needs of the fashion supply chain has parallels with the needs and opportunities for

developing the UK fashion industry. The delegation thought the infrastructure investment approach being adopted in New York would be interesting to examine in greater detail as this approach could potentially be beneficial to supporting the re-shoring of fashion manufacturing in London and the North of England where fashion businesses are already clustered.

3.5 Workforce Development

Policymakers in New York, like the UK, are focused on attracting and creating good quality jobs for people that will bring wider social prosperity. On the mission the group heard a number of the challenges and needs for workforce development in fashion from the ageing garment workers, expertise in applying technology and data science as well as knowledge of social and environmental sustainability impacts and solutions. NYCEDC, the Design Schools and CFDA all spoke of their initiatives, programmes, collaborations and resources to support workforce development in the fashion industry. Many of the workforce challenges and needs in the US are true for the skills development of the UK fashion workforce, and therefore there would be mutually beneficial to share approaches and resources.

3.6 Technology Innovation

Technology is profoundly changing the business model and operation of the fashion industry, and this is as true in the US as it is in the UK. Technology is changing the sourcing of materials, manufacturing of garments, the delivery logistics and the sale of garments. Technology, for example, is enabling the creation of new dyes, fabrics and textiles; creating high efficiency with on-demand manufacturing of garments; sophisticated transportation logistics and generation of customer data insights to effectively target marketing and sales strategies. There is a growth in business-to-consumer sales models versus the traditional business-to-business sales models. Technology is giving fashion brands the opportunity to directly communicate and sell to customers – enabling them to control the story of their brand more effectively. Moving to a direct-to-consumer business model is seen as more attractive to New York fashion brands as it can result in increased margins and is nimbler for enabling sustainability initiatives to come through quicker. It was felt by fashion businesses spoken to that the wholesale fashion system mitigates against more rapid progress towards a sustainable future.

The mission delegates were impressed by the fashion technology companies that are creating software platforms, analytics and business models that will help unlock opportunities for creating greater transparency, traceability and alternatives to some of the key sustainability challenges in the fashion industry.

3.7 Academic R&D

The design schools we visited did not seem to have large academic-led research and development programmes. The examples of research projects shared with a sustainability angle were typically connected to undergraduate and master student programmes rather than post-graduate and senior academic-led research programmes. This is because the income of US design schools is primarily from student tuition fees and corporate sponsorship versus in the UK where the government funds research councils to run grant competitions in priority areas for academics to apply. US design schools do not have the mandate or resources from government agencies or fashion businesses to lead strategic research and development to address the sustainability challenges in fashion. Other US education institutions, such as Cornell University and MIT might be where more fashion-related sustainability research and development is carried out.

4. Conclusion

To conclude, the following table outlines the key strengths, weaknesses and opportunities following this Global Expert Mission.

Area	Strengths	Weaknesses	Opportunities
Policy	New York and UK both have net carbon zero policies. Both the UK and US have a priority on job creation in both the green economy and creative industries. They are developing schemes to re-shore business operations and support high-value business activities.	Federal government is not putting in place policies and legislation to incentivise carbon emission reductions. There is no legislation to tackle fashion waste generation so much of the pre- and post-consumer garments end up being landfilled or used as feedstock in energy from waste plants.	Exchange between UK and US agencies on clean growth policies and assistance.
Innovation	An emergence of fashion technology innovation that is developing services to assist fashion businesses in sourcing fabrics, managing inventory and recycling garments that will help reduce environmental impacts.	Fashion businesses are not yet driving demand for development of innovation, technologies and business models that will meet at scale the sustainability challenges in fashion.	UK has a lot of innovation in this sector so there could be opportunities for collaboration with US fashion technology companies to enable British and US fashion companies to pilot and scale fashion technology solutions with sustainability benefit.
Funding	There is some start-up funding for fashion technology businesses and grant assistance for manufacturing businesses to purchase energy-efficient equipment.	The funding available is not typically for R&D sustainable fashion solutions. No public funding programmes are taking a systems approach to the sustainability challenges of fashion.	Run funding competitions for R&D stage fashion innovation which also tackle a sustainability challenge.
Academia	Environmental sustainability is being integrated into the curriculum of the design schools with which the delegation met. Teaching on fashion and sustainability areas requires a multi- and interdisciplinary approach.	The Design Schools focus on student-led research projects and collaborations. There does not appear to be large academic-led R&D sustainable fashion programmes.	Knowledge exchange between UK and US institutions, especially in areas of systems and circular economy models to be able to tackle the international challenges of the fashion supply chain.

Environmental protection: The UK government and the fashion industry are demonstrating climate leadership. The consumer is seen as having an important role in helping mobilise the fashion industry to develop sustainability solutions. Young people coming into the profession have interests and concerns to develop sustainability solutions for the fashion industry.

Environmental policy: New York and the UK both have commitments to be net carbon zero and encourage the development of the green economy, but the US does not have a strong environmental policy framework at the national level to stimulate good practice through the US fashion industry supply chain.

R&D funding: There is only small amounts of public funding available to entrepreneurs and businesses for R&D and innovation in fashion sustainability. Private funding sources are how fashion entrepreneurs and businesses access financing to support their innovation. Still, these are not particularly focused on sustainable fashion innovations and typically are not geared at early-stage business development.

Infrastructure investment: New York is investing in infrastructure to support the development of locally-based manufacturing businesses in the city. In addition to the development of creative industry clusters, NYCEDC provides grant support for businesses to invest in energy-efficient equipment and advanced technologies.

Workforce development: There is an ageing workforce in the traditional fashion manufacturing businesses, which requires attracting people into the sector to be trained to do these jobs. New job skills are also required with the adoption of technologies in all parts of the supply chain from design to manufacturing to retailing.

Technology innovation: There is an emergence of fashion technology companies that are assisting fashion companies to reduce environmental impacts through improving sourcing, stock management and recycling.

Academic R&D: Design Schools are integrating environmental sustainability into student training and collaborating with corporate.

Annex 1

List of UK Participants

Ahluwalia Studio

Ananas Anam

Arts and Humanities Research Council

British Fashion Council

Common Objective

Innovate UK

Knowledge Transfer Network

Pilio

UK Department of International Trade

University of Leeds/Future Fashion Factory

List of US Stakeholders

Closed Loop

Council of Fashion Designers of America (CFDA)

EON

Fashion Institute for Technology

Julie Gilhart Consulting

Make It Black

Mara Hoffman

NeueHouse

New York City Economic Development Corporation (NYCEDC)

New York Fashion Tech Lab

Parsons School of Design

Queen of Raw

STUDY New York

Rhode Island School of Design

Tomorrow London

UN Sustainable Development Goals team & Conscious Fashion Campaign

Zero Waste Daniel



