REPORT

the mills fabrica 南豐作坊

SYNTHETIC BIOLOGY OPPORTUNITIES IN FASHION AND FOOD

Content

Executive Summary	3
The Emergence of Synbio	5
Innovation Trends in Fashion & Food	12
Building Impactful Collaborations	21
Concluding Thoughts	26
Disclaimer	27

Executive Summary

In this report, we look into Synthetic Biology, a new discipline within modern biotechnology. It aims to precisely **design and redesign new and existing biological systems**, allowing the creation of products with specific, customized functions. Just like the emergence of the Internet, it is seen as **a disruptive technology**, paving the way for endless new innovations in the coming decades.

Environmental issues brought about by climate change is driving both fashion and food industries to search for innovative solutions. With the help of synbio, both industries are starting to adopt **new sustainable material alternatives**, e.g. bio-synthetics and cell-based meat. Though promising, many synbio innovations are in early stages of commercialization.

With reference to case studies and examples of **successful corporate-startup partnerships**, we believe corporates and synbio startups should join forces to help accelerate the adoption and development of synbio innovations.

Overview

Executive Summary

The Emergence of Synbio

We explain how synbio works, and the underlying technologies that enable its growth. Three key drivers are identified, contributing to the synbio boom – this includes lowered gene sequencing cost, gene editing tools like CRISPR & machine learning to digitize biology.

Innovation Trends in Fashion & Food

We deep dive into synbio applications in the fashion & food industry, discussing how sustainability issues are addressed in the following categories:

- Fashion: New materials, textile processing
- Food: Agriculture, food additives & ingredients, alternative proteins

Building Impactful Collaborations

We discuss the synergies and value created by corporate-startup collaborations. We also look into the key steps involved in forming an impactful partnership, highlighting tips and successful examples.

The Emergence of Synbio

From past to future

Technology wave

The Emergence of Synbio

Innovations has always come in waves, enabled by new underlying technology platforms; Synbio will be key tech enabler for the coming decade.

1940s

Petrochemicals

Enables wider range of manufacturing production

Fabrics & dyes

Detergents

Plastics

Tyres

ExxonMobil Chemical

DUPONT

BASF
We create chemistry

1990s

Internet

Enables faster and cheaper telecommunications

Web browser

Cloud computing

Wireless network

E-commerce

amazon

Google

Microsoft

Future

Synbio

Enables creation of products with enhanced performance & personalization

Removal of allergens

Vaccines

Lab-grown meat

Sustainable biofuels & materials

IMPOSSIBLE™

TWIST BIOSCIENCE

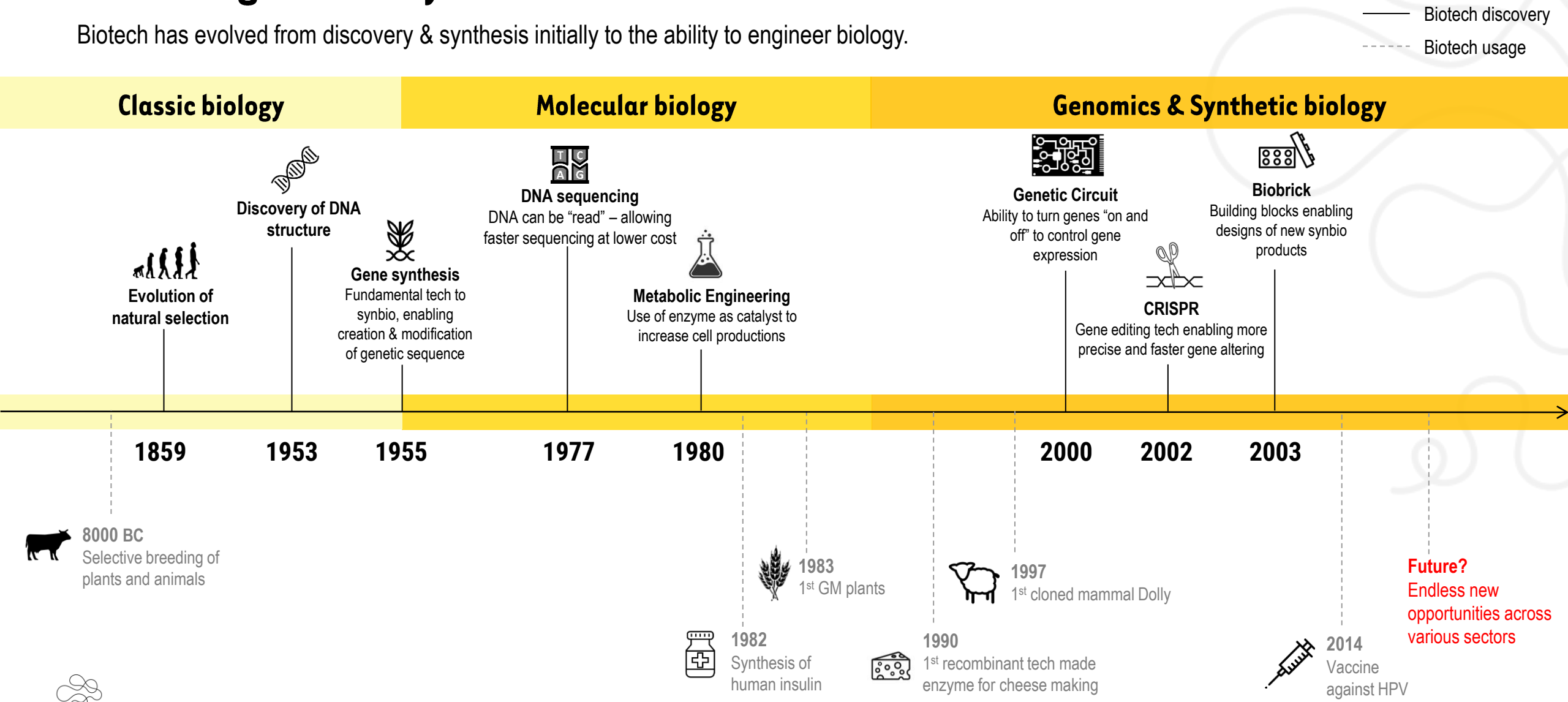
CRISPR THERAPEUTICS

Sources: McKinsey, Fabrica analysis

Origin of synbio

The Emergence of Synbio

Biotech has evolved from discovery & synthesis initially to the ability to engineer biology.



Sources: Conosco, eLife, Techinfographics, Fabrica analysis

Synbio explained

The Emergence of Synbio

Similar to computer technology, synthetic biology is about programming and engineering living cells to achieve target outputs.

How Computer Technology works

Programming language is written in sequences of **1s and 0s**

Computer programmers write codes with numbers to create specific computer software

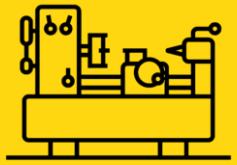
Written computer codes are **run in a computer** to perform specified tasks/ functions

How Synthetic Biology works

Genes and genomes are made of DNA, which contains 4 basic building blocks (Represented by **letters A, T, G, C**)

The sequence of these letters forms unique genetic traits.

Scientists can copy/ alter DNA sequence from an existing organism in nature, or create **a novel one** to obtain desirable traits



Machine: DNA synthesizer

Synthetic DNA is created using the written sequences

DNA program is put into and **run in a cell** or organism – ranging from a bacteria to an animal/ plant

Source: Oreilly, Synbiobeta, Fabrica analysis

Synbio overview

The Emergence of Synbio

Synbio as a subset of wider technologies underlying biotechnology.

Synbio enablers

Traditional biotech

Use of **natural** living organisms to create or modify products for better human use

- *Breeding of animals & crops*
- *Cheese & wine fermentation*

Genetic engineering

Foundation to biotech that involves **direct manipulation** of genetic information in cells to **alter traits** of living organisms

Process

i. New DNA isolated/ copied from genetic material of interest

ii. Isolated DNA inserted into host organism to produce an improved/ novel organism

Modern biotechnology

Manipulation of genes and cells to produce organisms with desirable new traits

Synthetic biology

Unlike genetic engineering which introduces only small changes to a system, synbio aims to **precisely design and redesign new/ existing biological system** at a bigger scale, to create products with specific functions

Cellular Agriculture

The use of microbes/ cells to culture a biological replica of animal-based products in lab

- 2 production methods: Acellular, cellular

Fermentation

A chemical process where organic substances, usually sugar, are broken down by a microbe, producing target ingredients

Traditional fermentation - Typically used in food for pasteurization and sterilization purposes, e.g. cheese making, pickled food

Precision fermentation - Advanced tech that combines gene editing & fermentation

- Enables making of more specific, customized molecules from engineered microbes

Acellular production

Cells/ Microbes (e.g. yeast, bacteria) are used as a "factory" to produce ingredients/ proteins

Precision fermentation

Use gene-edited microbes to produce desired molecules

End products: Wide range of molecules, e.g. proteins, enzymes, fats, to be used as ingredients for food, textiles & more

BOLT THREADS

Clara Foods

Others

Use stem cells to express target products

End product: Cultured milk

TurtleTree Labs

BIOMILQ

Cellular production

Grow proteins, muscles or fats directly from cells (typically stem cells) in lab. The cells will then be used to form the basis of the products themselves

End products: Cultured meat, lab-grown leather, lab-grown cellulose, artificial organs

MISSION BARNS

FUTURE MEAT

VitroLabs Inc

Synbio, a new discipline within modern biotech, combines math, computing, biology & chemistry

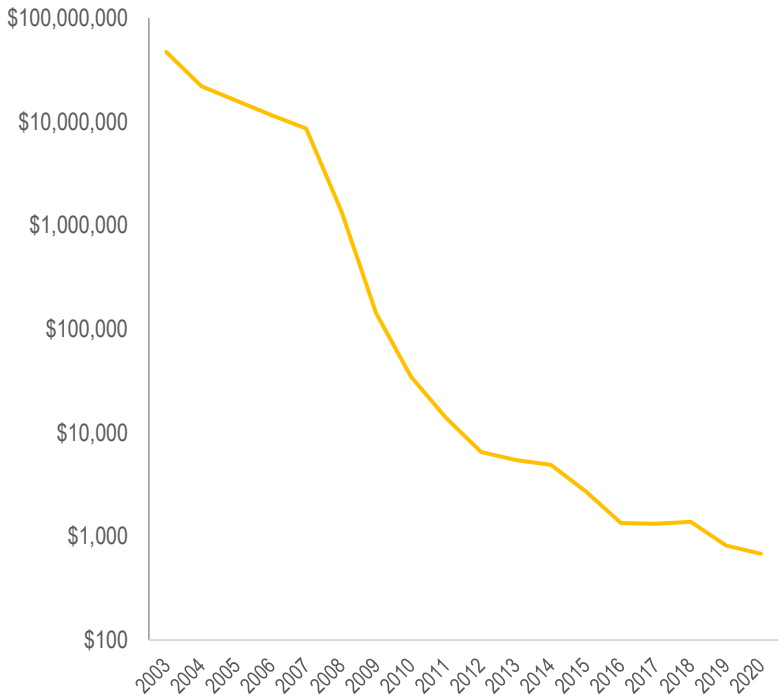
Source: Biofabricate, Oreilly, Friends of Earth, Fabrica analysis

Synbio drivers

The Emergence of Synbio

The boom in synbio is enabled by decreasing sequencing costs, CRISPR & computational bio.

1 Lowered DNA/ gene sequencing costs



2 CRISPR as a fast, cheap & accurate genome editing tool

CRISPR/Cas9, short for CRISPR, is a gene-editing technology that enables precise gene traits to be modified or removed in any animals and plants

- Undesirable and desirable traits can now be added and deleted, increasing the potential to create many more value-added products

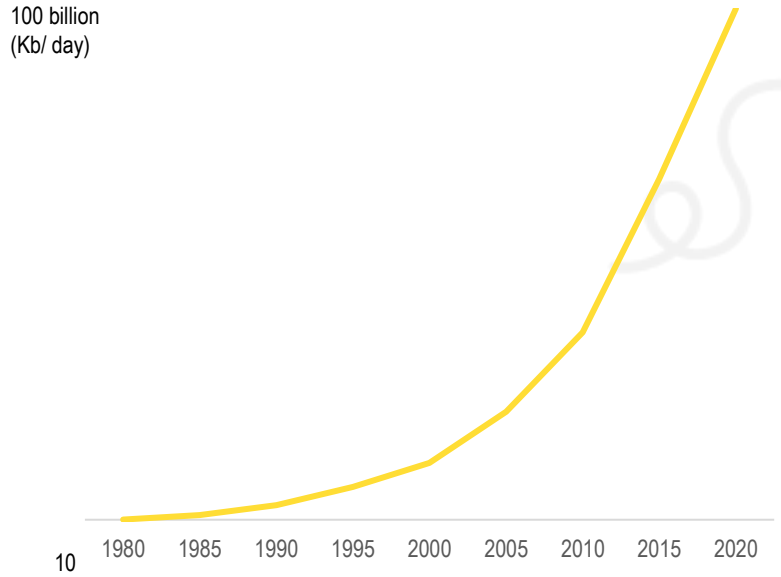
Key process in CRISPR tech

i. **Guide RNA** is used to identify the targeted gene
ii. **CRISPR/Cas9** acts as a scissor to cut out the undesired DNA located
iii. **Desired DNA** piece is inserted to replace the clipped section

3 Advances in machine learning enable faster gene sequencing & data analysis

Machine learning enables large sets of DNA sequence data to be analysed, allowing valuable biological information to be generated accurately & quickly

Speed of sequencing



Source: Synbiobeta, NIH, McKinsey, CB Insights, Fabrica analysis

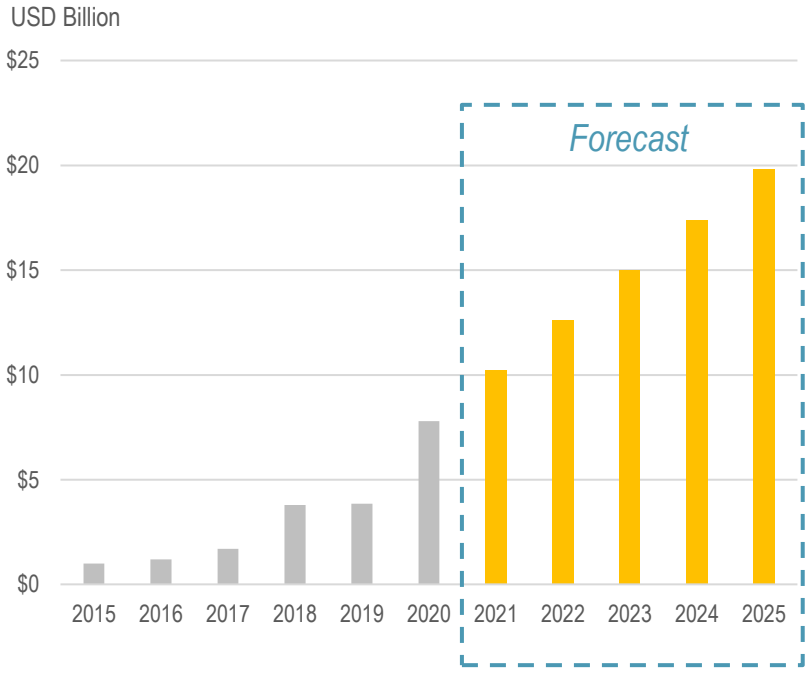
Synbio market

The Emergence of Synbio

High potential growth with prominent development across ag & food sectors.

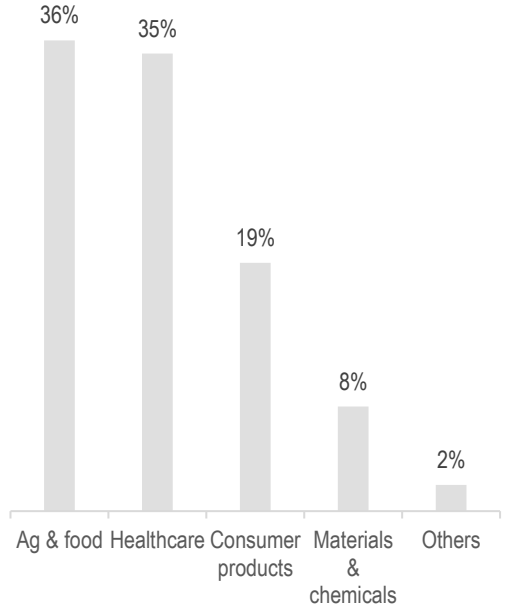
Synbio funding reaching a new record of ~ $8B USD in 2020; Projected to grow at ~24% CAGR to 2025

Global Synthetic Biology Market



Synbio breakthroughs have led to a proliferation of synbio startups across various sectors

Estimated potential economic impact on various sectors



Food & Beverages

Perfect Day, Geltor, Clara Foods, Impossible, Calysta, Fynd, Apeel Sciences, MycoTechnology, MilisBio, GlycosBio

Agriculture

Agrivida, Pivot Bio, agrimetis, Plant Sensory Systems

Biofuel & Industrial

LanzaTech, Sapphire Energy, Industrial Microbes, GreenBiologics, CinderBio, Joule

Apparel & Fashion

Bolt Threads, ColoriFix, Carbios, Modern Meadow, Spiber, Mango Materials, Myco Works, Cocoon Biotech Inc, huue, Algalife, genomatica

GM Platforms, DNA & RNA Synthesis & Software

Ginkgo Bioworks, Synthace, Twist Bioscience, zymergen, Berkeley Lights, Benchling, Riffyn, metamixis, Synthetic Genomics

Healthcare

moderna, synlogic, Eligo Bioscience, Codagenix Inc., synthorx

Source: Synbiobeta, McKinsey, Fabrica Analysis

Innovation Trends in Fashion & Food

From materials to consumables

Synbio in fashion

Innovation Trends in Fashion & Food

NEW MATERIALS

Precursor materials	Bio-synthetics	Protein-based materials	Cell-based materials
LanzaTech ZYMOCHEM	MYCO WORKS genomatica Modern Meadow MYCO WORKS MANGO MATERIALS AlgiKnit Algaeing ECOVATIVE DESIGN modern synthesis	AMSilk Spiber Kraig Biocraft Laboratories The Future is Made in the Laboratory BOLT THREADS Spintex	VitroLabs Inc PROVENANCE Gali

TEXTILE PROCESSING

Pre-treatment agents	Dyes & pigments	Finishing coatings
AVCO CHEMICALS novozymes	LIVING COLOUR Algaeing huue ColoriFix	CHECKERSPOT

Source: CB Insights, Plug and Play, Fabrica Analysis

Fashion – new materials

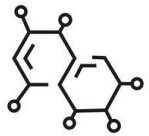
Innovation Trends in Fashion & Food

Reducing fossil fuel dependency through the development of novel precursors and biomaterials. Bio-synthetics, in particular has shown promising potentials & is already used in wide range of textile products.

PROBLEMS

- 60% of textile fibers are **synthetics** (polyester, nylon & acrylic) made from fossil fuels
  - Production is energy-intensive with high GHG emission
  - Non-biodegradable
  - Introduces plastics into the ocean as they release microfibers into the water when being washed
- **Biodegradable materials from renewable sources** present great potentials to reduce fossil fuel reliance and greenhouse gas emission

INNOVATIONS



Precursor materials

Commodity chemicals (typically ethanol) are used as building blocks to manufacture range of products, e.g. biofuels, textile materials

These chemicals can be produced sustainably using renewable feedstock such as:

- Waste gases, e.g. carbon dioxide, carbon monoxide
- Carbon & biomass-derived substrates

Textile materials

Bio-synthetics
e.g. Bio-polyesters, bio-nylon, mycelium leather

Polymers made wholly or partially from biological sources, e.g.
- **1st gen**: Crops (e.g. corn, sugar cane, wheat)
- **2nd gen**: Agricultural waste
- **3rd gen**: Microorganisms (from algae, fungi, bacteria, yeast)

These feedstocks usually undergo fermentation/ chemical process that break them down into polymers. The polymers are then spun & woven into fabric.

Protein-based
Synthetic spider silk

Editing and transferring silk-producing genes to host organisms, e.g. bacteria/ fungi, to mass produce spider silk proteins

Cell-based
Lab-grown leather, lab-grown cellulose

Using tissue engineering technology to grow materials from cells in lab

Source: Fashion for Good, Textile Exchange, Ellen Macarthur Foundation, Fibre2Fashion, Bioeconomy, Fabrica analysis

Fashion – textile processing

Innovation Trends in Fashion & Food

Synbio opens up more options for chemical-free dyes and agents with similar or even advanced properties. Below are 3 key synbio applications in textile processing.

PROBLEMS

- 20% of global industrial water pollution is attributable to the toxic chemicals & heavy metals from **dyeing and treatment of textile**
- The cost of filtering waste water is high. As a result, over three-quarters of water consumed by dye mills end up as undrinkable waste
- Replacing use of hazardous chemicals with **bio-synthesized dye/ finishing agents** can effectively reduce water pollution issues

INNOVATIONS

Pre-treatment

Starch-degrading enzymes
Enzymes are used to *replace conventional chemical de-sizing agents*, e.g. acid, alkali, oxidizing agents

- De-sizing is a pre-treatment process before beaching/ dyeing
- Enzymes offer advantages of better quality control with less water usage

Dyeing

Bio-synthesized dyes
Production typically involves fermentation using 2 main categories of feedstocks

Engineered microorganisms (e.g. algae, bacteria, fungi) – Using cells to produce & deposit pigments into fiber

- Significantly lowers water & energy usage

Molecules converted from renewable sources – Biological enzymes are used to convert carbon into molecules that produce dyes

- Effectively reduces waste & by-products

Finishing

Bio-based hydrophobic coating
Engineering micro-algae to produce bio-based oils

- Finishing in athletic wear with hydrophobic (water-repellent) properties
- Replacement for toxic fluorinated coating

Source: Fashion for Good, Textile Exchange, Ellen Macarthur Foundation, Fibre2Fashion, Bioeconomy, Fabrica analysis

Synbio in agriculture & food

Innovation Trends in Fashion & Food

AGRICULTURE

Biopesticides & biofertilizers	Plant breeding	Biosensors	Post-harvest treatments
concentric, CROP ENHANCEMENT, PIVOT BIO	Tropic Biosciences, AMFORA, pairwise, HUDSON RIVER Biotechnology, BENSON HILL, calyxt, CIBUS	INNERPLANT	APEEL SCIENCES, hazel technologies inc., SUFRESCA Extend Agricultural Profitability

FOOD ADDITIVES & INGREDIENTS

Colorants & sweeteners	Hypoallergenic ingredients
michroma, Amai Proteins, EVOLVA, phytowelt GreenTechnologies GmbH, Sweegen, miraculex, MilisBio, amyris	ukko

ALTERNATIVE PROTEINS

Recombinant proteins	Cultured meat
Clara Foods, Perfect Day, BioscienZ, CHANGE DAIRY. DONE DIFFERENT., GELTOR, New Culture, PROVENANCE	MISSION BARNS, JUST, UPSIDE Foods, FUTURE MEAT

Source: CB Insights, Plug and Play, Fabrica Analysis

Food – agriculture

Innovation Trends in Fashion & Food

Key focuses on solving food security and supply issues without harming the environment; while synbio helps solve agricultural issues in 3 key areas as shown below.

PROBLEMS

- Agriculture brings massive harm to the environment
  - High greenhouse gas emission, e.g. methane from cattle & rice farms, nitrous oxide from fertilized fields
  - High water usage & pollutants
  - Accelerates biodiversity loss as forests are cleared for farms
- With the growing population and changing diets, current food production system is unable to satisfy the demand
- More **sustainable farming practices** are needed to **increase productivity** while ensuring **efficient resource usage**

INNOVATIONS

Plant breeding

Breeding of crops/ seeds with **improved traits** via synthesized genes & CRISPR gene editing

- Produce **new fruit & vegetable variants** with possibly better taste, higher yield, longer shelf life, simpler harvesting and more

Crop cultivation

Improve crop performances without chemical usage:

- **Biopesticides** are engineered to target specific pathogens without harming other species
- **Biofertilizers** contains engineered microbes which convert nitrogen into nutrients for crops
- **Biosensors** for soil & crop monitoring (detection of pathogens & contaminants)

Post-harvest

Treatments to **prolong shelf life** after harvesting

- **Biodegradable coatings**
- **Ethylene** (natural plant-ripening hormones) inhibitors, e.g. 1-MCP

Source: Fashion for Good, Textile Exchange, Ellen Macarthur Foundation, Fibre2Fashion, Bioeconomy, Fabrica analysis

Food – food additives & ingredients

Innovation Trends in Fashion & Food

Synbio helps minimize chemical usage & genetic modification in food products as synbio companies are actively exploring new options to develop better ingredients.

PROBLEMS

- Issues associated with current food products:
  - 70% of products contain **synthetic petroleum-based food dyes**, which are linked to allergies, hyperactivity, & even cancer
  - Sugar is associated with higher risks of diabetes, obesity & heart diseases
    - Conventional sugar substitutes, e.g. xylitol, are also harmful to health and has a bitter aftertaste
- With the **increase in consumer awareness** of health issues, there is a rising demand towards novel nature-based food additives & ingredients

INNOVATIONS

Food colorants

Replaces traditional chemical synthesis & natural plant extraction (where color molecules tend to be temperature and pH unstable):

- **High-performance, natural colorants** - using gene-editing technology, e.g. CRISPR, to engineer microbes that have the ability to secrete colors

Sugar substitutes

Develops better tasting, calorie-free sweeteners:

- Engineer Stevia (a natural sweetener) with no bitter aftertaste
- E.g. **Pure Reb-M** can be produced using yeast culture & sugar via fermentation
  - Reb-M is a super-sweet steviol glucosides in the stevia plant that is very rare & difficult to isolate

Hypoallergenic ingredients

Design food ingredients to eliminate allergenicity or to prevent triggering the immune system

i. **Allergen identification** - identify elements of proteins that trigger allergic responses with the help of AI
ii. **Allergen removal** - Once recognized, these elements are altered or removed while maintaining the structure & overall traits of the proteins

Source: Food Navigator, Synbiobeta, Vegconomist, Venture Beat, Fabrica analysis

Food – alternative proteins

Innovation Trends in Fashion & Food

Innovations are predicted to move mainstream mainly driven by health & sustainability. Below are 2 key tech in alternative protein production include precision fermentation & cell cultivation.

PROBLEMS

- Present livestock agricultural system is unsustainable due to resource demand and environmental impact
  - Livestock farming alone generates **18% total green house gas emissions**
  - To produce 1kg of beef requires **25kg of grain & 15,000L of water**
- Increased consumers' concerns about health and food safety
  - Intake of antibiotics through meat consumption
  - Food-borne illnesses, e.g. E. coli, salmonella, are often transmitted via meat contaminations
- Development of alternative proteins could satisfy consumer needs and take pressure off the environmental from traditional livestock

INNOVATIONS

Recombinant proteins

Precision fermentation

i. Recombinant DNA tech: Making of GM microbes
ii. Precision fermentation: GM microbes (e.g. bacteria, yeasts, fungi) produces desired proteins through fermentation
iii. End products: Protein isolates, e.g. dairy/ egg-white proteins, collagen

Cultured meat/ animal products

Cell cultivation

i. Deriving starting cells: Isolate stem/ embryonic cells from sample animals
ii. Cell proliferation: Cells are put into culture media where they multiply
iii. Tissue perfusion: Cells differentiate into muscle, fat & connective tissues, and then scaffold into a desired structure
iv. End products: Whole piece of meat

Source: McKinsey, Good Food Institute, Oxford University, Fabrica analysis

Fashion vs Food

Innovation Trends in Fashion & Food

Synbio application in food industry is wider than that of fashion, with more active investment activities.

Sector	Selected synbio companies valued 100M+ USD
Fashion	LanzaTech; Kraig Biocraft Laboratories (The Future is Made in the Laboratory); genomatica; BOLT THREADS; PRECISION BIOSCIENCES; Modern Meadow; CHECKERSPOT; Spiber; MYCOWORKS
Food	GINKGO BIOWORKS (THE ORGANISM COMPANY); MYCO TECHNOLOGY; IMPOSSIBLE; EVOLVA; Fynd; Apeel Sciences; IMPOSSIBLE; PIVOT BIO; JUST; amyris; CALYSTA; Perfect Day; Geltor; UPSIDE Foods

Comparison across sectors – 2 vital pillars within the lifestyle industry

	Fashion	Food
Raw material source	Production of fiber, crops & livestock rely heavily on conventional farming industry → Competition for land & energy usage	
Sustainability challenge	Consumers often turn away from sustainable brands due to higher price points	
Environmental threats	Fast fashion trend increases disposal rate of clothing items, adding burden to the environment	Livestock farming requires extensive land for pasturing, leading to forestation
Future trends	In need of innovations to shift towards sustainable practices	
Regulatory restrictions	Lower	Higher
Margin/ cost	Higher margins, esp luxury products	Lower margins; more cost competitive
Go-to-market	Mostly self-contained	Can leverage 3rd party distribution/ retailer
Nature of sector	More consolidated corporates	More fragmented market
Technology development	Relatively limited in terms of scope – clothing industry is dominated by 2 types of materials, cotton & polyester	Broader range of food & beverages, e.g. dairy, egg, meat

Sources: Crunchbase, Finistere Ventures, VegNews, Fabrica analysis

Building Impactful Collaborations

About synbio partnerships

Working with innovators

Building Impactful Collaborations

Collaborations bring synergies & value-add beyond what corporates & startups can achieve individually.

Rising number of pilots between corporates and innovators in recent years

New partnerships formed in 2021

Stella McCartney Debuts World's First 'Mylo' Bustier & Trousers With Bolt Threads's Mushroom Leather

H&M X Desserto: Fashion Giant Uses Mexican Startup's Cactus Leather In New Sustainable Collection

Business

BlueNalu Signs MOUs with Mitsubishi Corporation and Thai Union to Accelerate Market Development Strategy for Cell-Cultured

April 29, 2021, 4:30 AM GMT+8

Burger King's nationwide rollout of the Impossible Whopper starts next week

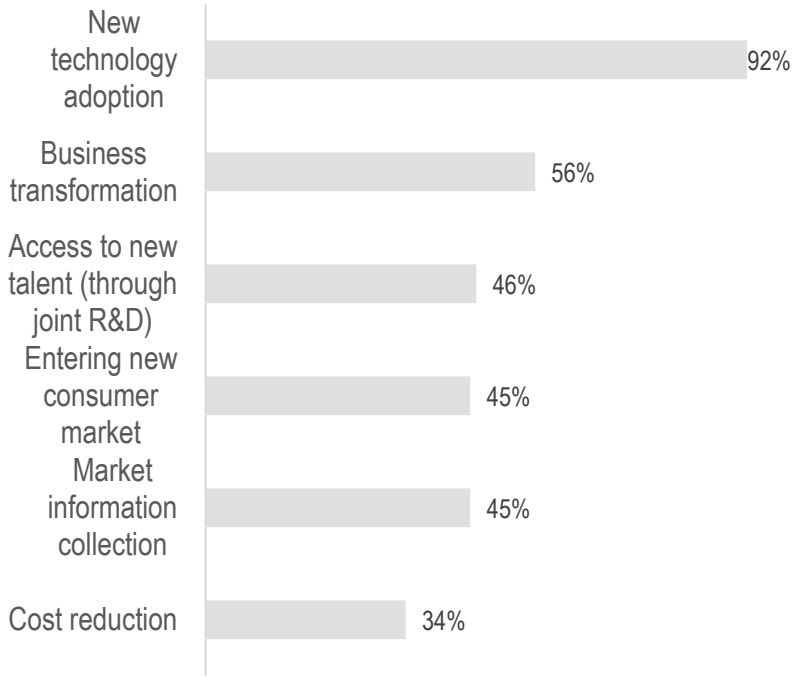
To more than 7,000 locations

By Ashley Carman | @ashleycarman | Aug 1, 2019, 5:08pm EDT

Clara Foods Launches World's First Animal-Free Pepsin With Global Giant Ingredion

Most corporates form pilots with startups to adopt/ test new tech innovations

Reasons driving corporates to engage with startups



Pilots can be done in 2 general forms

i. **Pilot launches:** Working directly with an innovator to launch a product, where the corporate brings in their own supply chain partners to support production

An Exclusive Collaboration by Hermès and MycoWorks

HERMÈS PARIS X MYCOWORKS

ii. **Industry collaborations:** Working with a consortium of brands or supply chain partners

MYLO™ TO BE INTRODUCED BY CONSORTIUM OF BIG NAME BRANDS

STELLA McCARTNEY KERING lululemon adidas

X

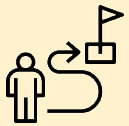
BOLT THREADS

Source: 500 Startups, Green Queen, Fabrica Analysis

Steps to forming a synbio partnership

Building Impactful Collaborations

Brands should start with a purpose followed by a series of pilots and assessments.

1	2	3	4
Define 	**Pilot** 	**Assess** 	**Communicate** 
• What is your value proposition? E.g. sustainability, consumer trends • Does the purpose of this partnership align with your overall goals?	• Which criteria do you use when choosing innovators to partner with? • What is the timeline of pilots? • What factors are needed to ensure pilots run successfully?	• How do you assess the results of pilots? • What are the learnings or insights you can draw from the pilots?	• How do you communicate the results to the general public? • Based on the project experience, what can be done to drive for wider industry impacts in the future?

Source: Fabrica Analysis

Synbio partnerships

Building Impactful Collaborations

Proper milestone settings are crucial in getting the project moving, though adjustments are expected along the way.

1. Define — Aligning pilot goals with like-minded startups

Potential sustainability goals

Animal-free

Graeter's Ice Cream partners with innovator Perfect Day to launch a line of frozen desserts using Perfect Day's animal-free dairy proteins

Carbon reduction

Hermès partners with innovator MycoWorks to create a bag using mycelium leather, a biodegradable material with lower carbon footprint

Waste management

H&M is launching a collection made with vegan leather from wine waste supplied by innovator Vegea

Plastic-free

Renowned vegetable grower, Houweling's Group, has partnered with innovator Apeel Sciences to launch plastic-free cucumbers

2. Pilot — Typical process

i. Innovator selection

- Select "hero product" that best showcases innovation features while having enough margin buffer to cover higher initial costs
- Validate technology of startups based on proven case studies, and ensure that its production is feasible at larger scale

ii. Product design & development

- Offer industry expertise to innovators to help accelerate development, e.g. information on performance requirements

iii. Supply chain production

- Provide support & resources to innovators, e.g. supply chain partner introductions, marketing & branding

iv. Product launch

- Brand building & marketing in advance of launch to build consumer awareness and demand in target market
- Discussions on future roll-outs/ scale-ups including potential licensing model with supply chain partners

Ideal timeframe: Within 3-6 months

- A pilot should be a partnership between corporate & innovator, rather than a vendor-supplier relationship
- Setting key deadlines to ensure that all parties are working towards it

Source: Vegea, Apeel, Mycoworks, Food navigator, 500 Startups, Fabrica Analysis

Synbio partnerships

Building Impactful Collaborations

3. Assess — Conducting ongoing assessments to measure the results of pilots

The result of the pilot can be measured based on:

Attributes	Verifiable metrics
Consumers' response	• Consumers' feedback • Desirability & demand (sales performance) • Viability (Consumers' return rate)
Product performance/ feasibility	• Standard test criteria - e.g. tensile strength & abrasion resistance in leather alternatives • Composition of end product - e.g. % of virgin materials in a recycled fabric
Sustainability impact	• Life-cycle assessment (LCA) analyzes product's environmental impact (e.g. land & water use) from cradle to grave • Carbon footprint (metric tons per CO2e) measures total greenhouse gas emissions by a product

4. Communicate — Selecting appropriate strategies for storytelling and launch

Strategies	Competitive advantages	Example
Co-branded name	Provides innovators or corporate brands with an opportunity to differentiate among a crowded market	 **Burger King** launches Impossible Whooper with Impossible Foods
Embedded ingredient brand	Creates awareness, differentiation & preference for final products with specific component/ ingredient	 **Intel** displays "Intel Inside" logos on computers with Intel CPU inside
Product impact label	Creates transparency while allowing consumers to resonate, and create an impact	 **Allbirds** labels its products by their carbon footprint (kg per carbon dioxide)
Premium launch	Heightens demand and desirability through offering exclusive or limited product availability	 **Nike** worked with Off-White to launch "The Ten", limited edition collection
Influencer marketing	Establishes a market among celebrities/ industry experts to build credibility, trust & recognition	 **Oatly** launches "Barista Edition" oat milk, targeting skilled baristas at cafes

Source: Green Queen, Fabrica Analysis

Concluding Thoughts

The Emergence of Synbio

- Synbio is a new discipline within modern biotechnology that aims to precisely design and redesign new/ existing biological system at a bigger scale, to create products with specific functions
- Synbio market has high potential growth particularly across agriculture and food sectors. This boom is driven by 3 factors – lowered gene sequencing cost, gene editing like CRISPR, machine learning enabling faster sequencing/ data analysis

Innovation Trends in Fashion & Food

- 2 key applications in fashion – new materials, textile processing
  - Replacing petroleum-based synthetic fibers with sustainable new materials, e.g. bio-synthetics, protein-based & cell-based materials
  - Use of chemical-free dyes & agents during textile processing
- 3 key applications in food – agriculture, food additives & ingredients, alt. proteins
  - Optimizing plant breeding, crop cultivation & post-harvest crop protection without the use of harmful chemicals
  - Producing clean food additives and alt. proteins sustainably

Building Impactful Collaborations

- Most corporates form pilots with startups for adoption of new technology or business transformation with new marketing/ product launch
- A pilot should be treated as a collaborative partnership rather than a vendor-supplier relationship. It can be done through i) working with innovators directly to launch products or ii) forming an industry consortium
- Setting appropriate timeframes is crucial in getting all parties involved, managing expectations and moving towards implementation

Disclaimer

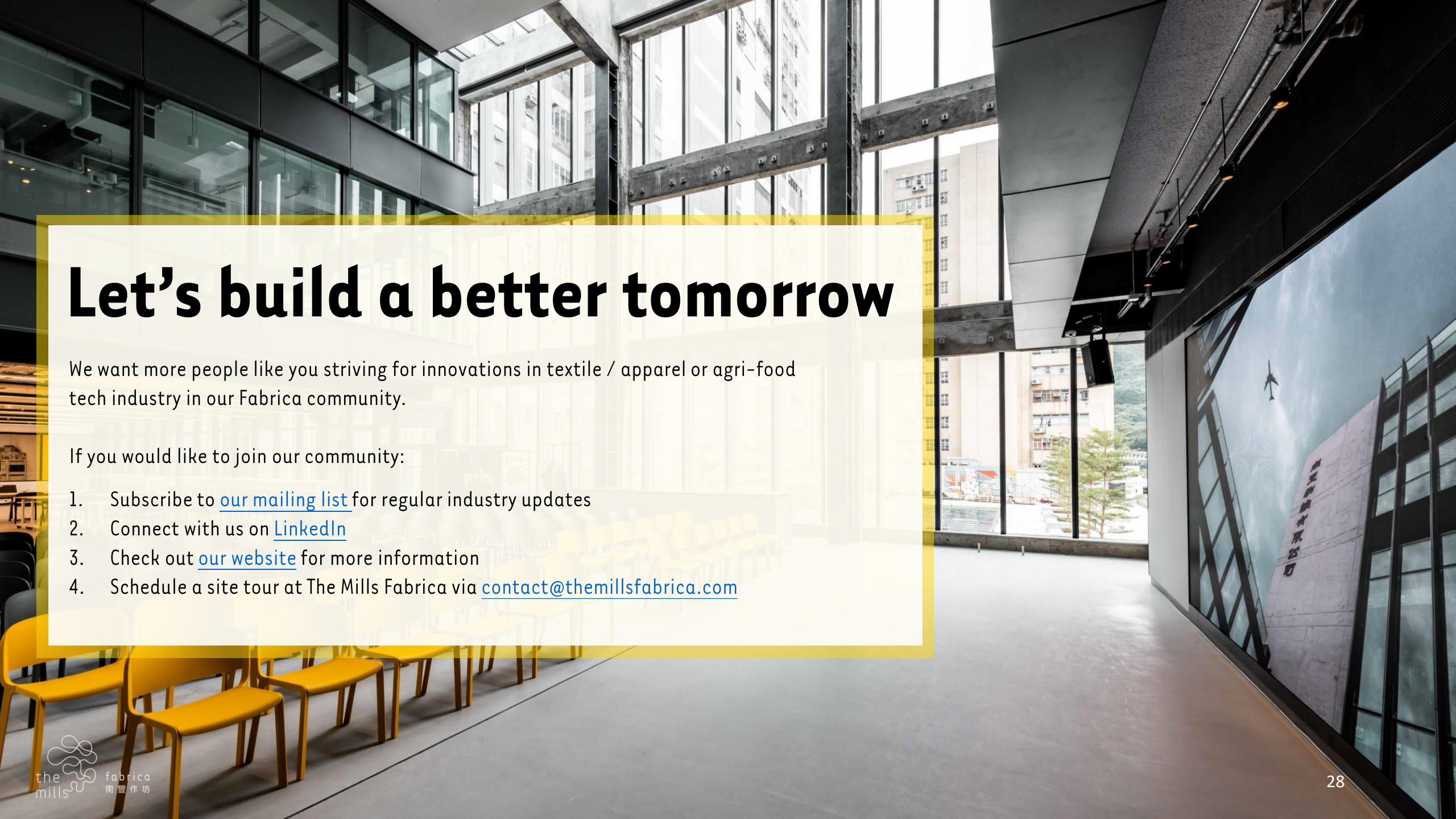
This information, statements, analysis, views, opinions and conclusions contained in this PowerPoint deck and any related materials have been prepared, compiled or provided by "The Mills Fabrica" (which expression covers those corporate entities include The Mills Limited, Fabrica Incubator Limited, The Mills (BVI) Limited and their subsidiaries, affiliates or partners) as a service to its members/site visitors/readers. They are not intended to constitute advice of any kind or the rendering of legal, consulting or other professional services.

All content found on this PowerPoint deck and related materials including figures, tables, charts, texts, images, audio, recording or other formats were created for information purposes only. They are meant to provide insights, and are general in nature, and the opinions or recommendations expressed in the Webinar PowerPoint deck are those of the authors only and may not necessarily represent the views of The Mills Fabrica.

Although The Mills Fabrica believes that all these information, both written and oral, given in the course of or in connections with the PowerPoint deck are correct and up to date, no warranty or representation or accuracy or suitability or reliability as to such presentation is given and no responsibility or liability is accepted by The Mills Fabrica or by any of its agents, directors, employees or by any person giving presentations or providing materials in respect of any loss, claims, costs or expenses, including indirect or consequential damages or lost profit, arising in any way from or in connection with errors or omissions in any information provided. The Mills Fabrica reserves the right to amend the information and the presentation at any time without notice.

The PowerPoint deck may include links to other resources and websites. These links are provided for convenience only and The Mills Fabrica does not endorse, approve or make any representation or claim regarding their accuracy, copyright, compliance or legality. Nor does it warrant the performance, effectiveness or applicability of any listed sites or links in the PowerPoint deck.

By accessing this PowerPoint deck, you acknowledge and agree that The Mills Fabrica disclaims any and all liability to you or any person for any direct, indirect, implied, punitive, special, incidental or other consequential damages arising directly or indirectly from any access to or participation in or use of the information contained herein.



Let’s build a better tomorrow

We want more people like you striving for innovations in textile / apparel or agri-food tech industry in our Fabrica community.

If you would like to join our community:

1. Subscribe to our mailing list for regular industry updates
2. Connect with us on LinkedIn
3. Check out our website for more information
4. Schedule a site tour at The Mills Fabrica via contact@themillsfabrica.com