香港紡織及成衣研發中心
The Hong Kong Research Institute of Textiles and Apparel

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Open Lab

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Why build a factory in one of the world’s most crowded, most expensive city?

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About Open Lab

→ Our mission is to support the fashion and textile industry to combat climate change by contributing to problem-solving, showcasing solutions, and providing a platform for industry-wide collaboration.

→ achieved by:

✓ **SCALE through collaboration**

- scale and commercialize solutions through multi-stakeholder partnerships and business model integrations

✓ **INNOVATE at speed**

- conduct R&D projects at speed through rapid iteration to identify disruptive and bold innovations

✓ **INSPIRE to impact**

- drive industry-wide change and inspire action through proof of concepts, prototypes and live demonstrations

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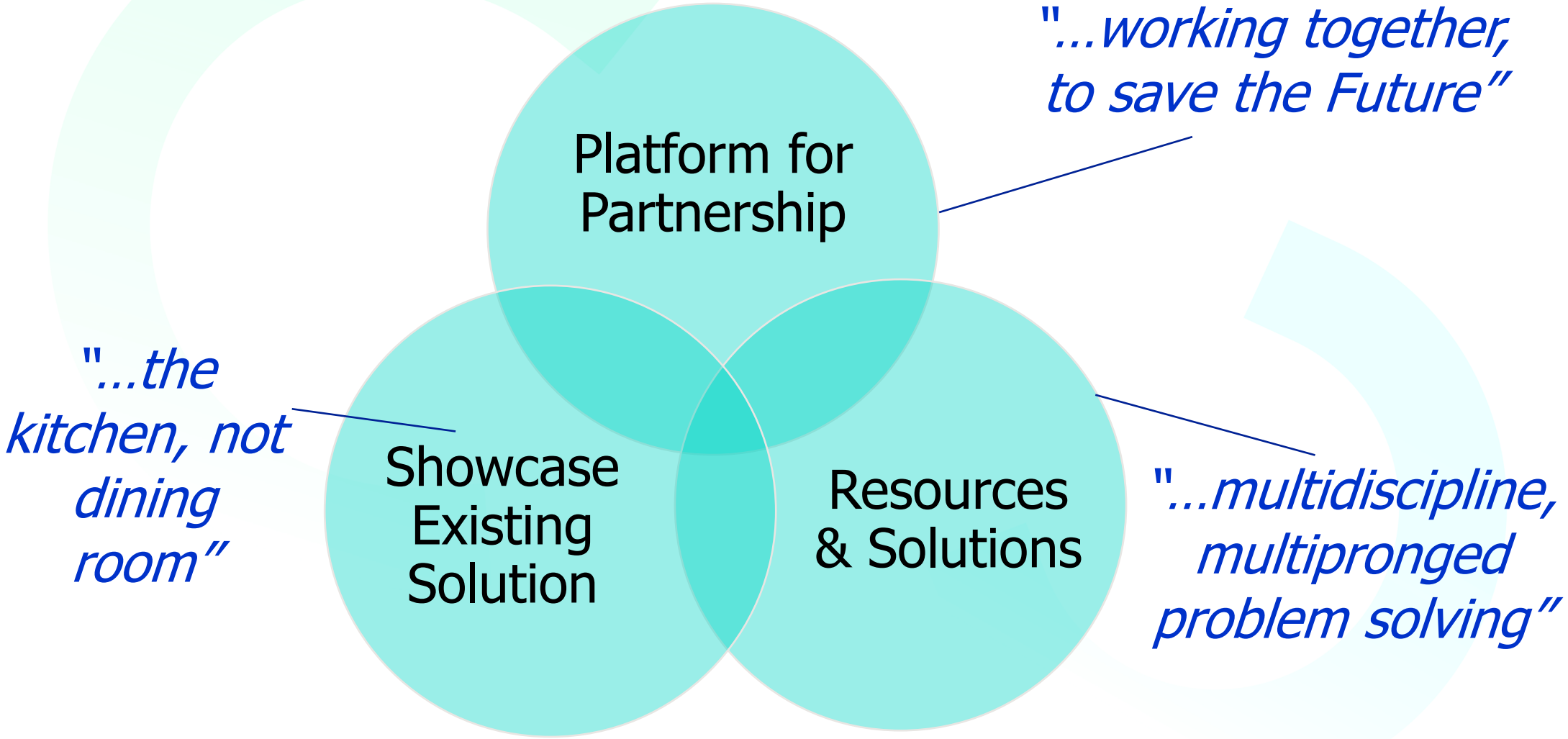
Addressing climate change through Open Lab



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Open Lab: Partnership & Collaboration Platform

→**over 80 projects, spanning a wide range of textile sustainability topics.**

→These include,

- Renewable & recycled Materials
- Environmental-friendly Treatment
- Energy & Water Saving Manufacturing
- GHG & Carbon Negative Solution
- Green Materials & Process
- Organic Materials & Biodiverse Practices

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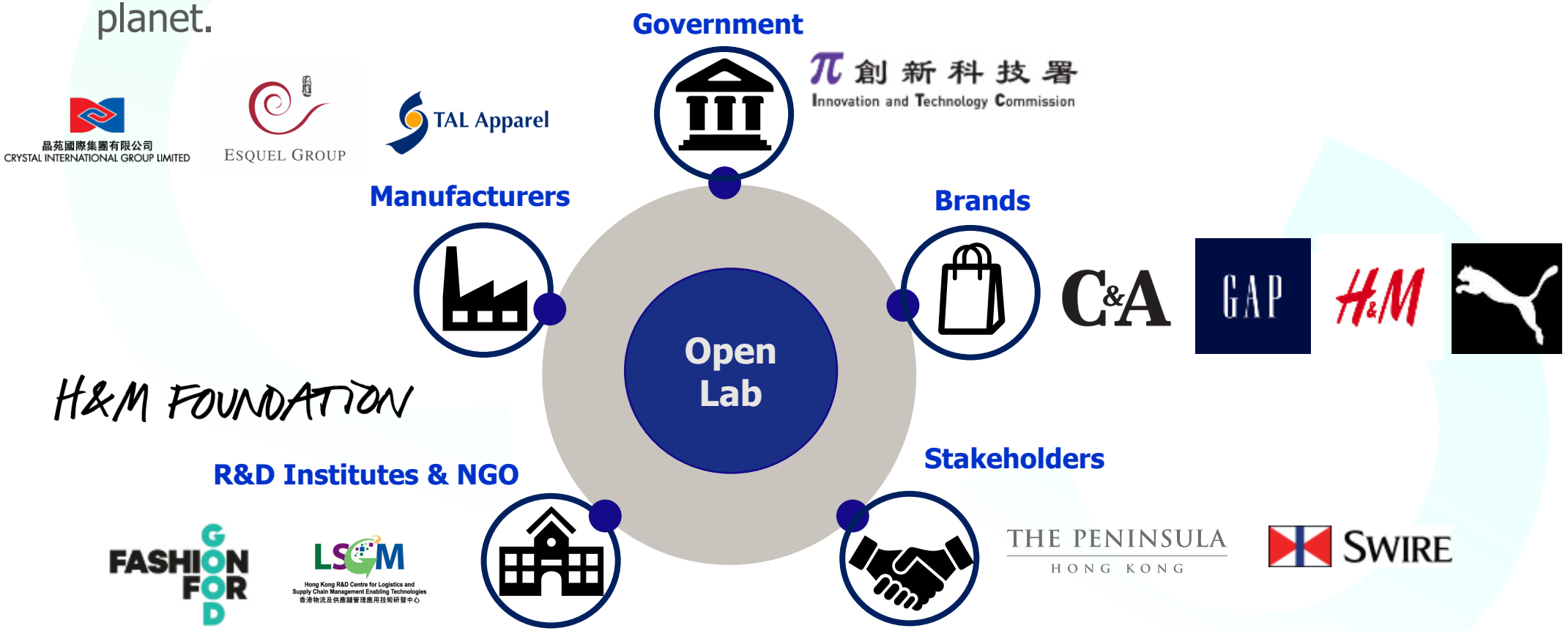
Open Lab: a Platform for Partnership

→ this innovative partnership is dedicated to exploring and discovering technologies that can actively contribute to building a fashion industry with a positive impact on our planet.



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Open Lab: Resources to Solve Problems

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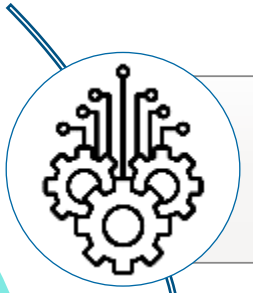
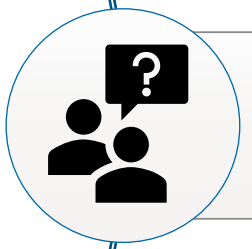
A focal point to deliver effective solutions



Integrate various resource including production facility, research execution and funding



Consultative support by scientists on specific questions from partners

Provide knowhow on circularity, recycling, new materials, new chemistry, separation LCA etc, for textile industry

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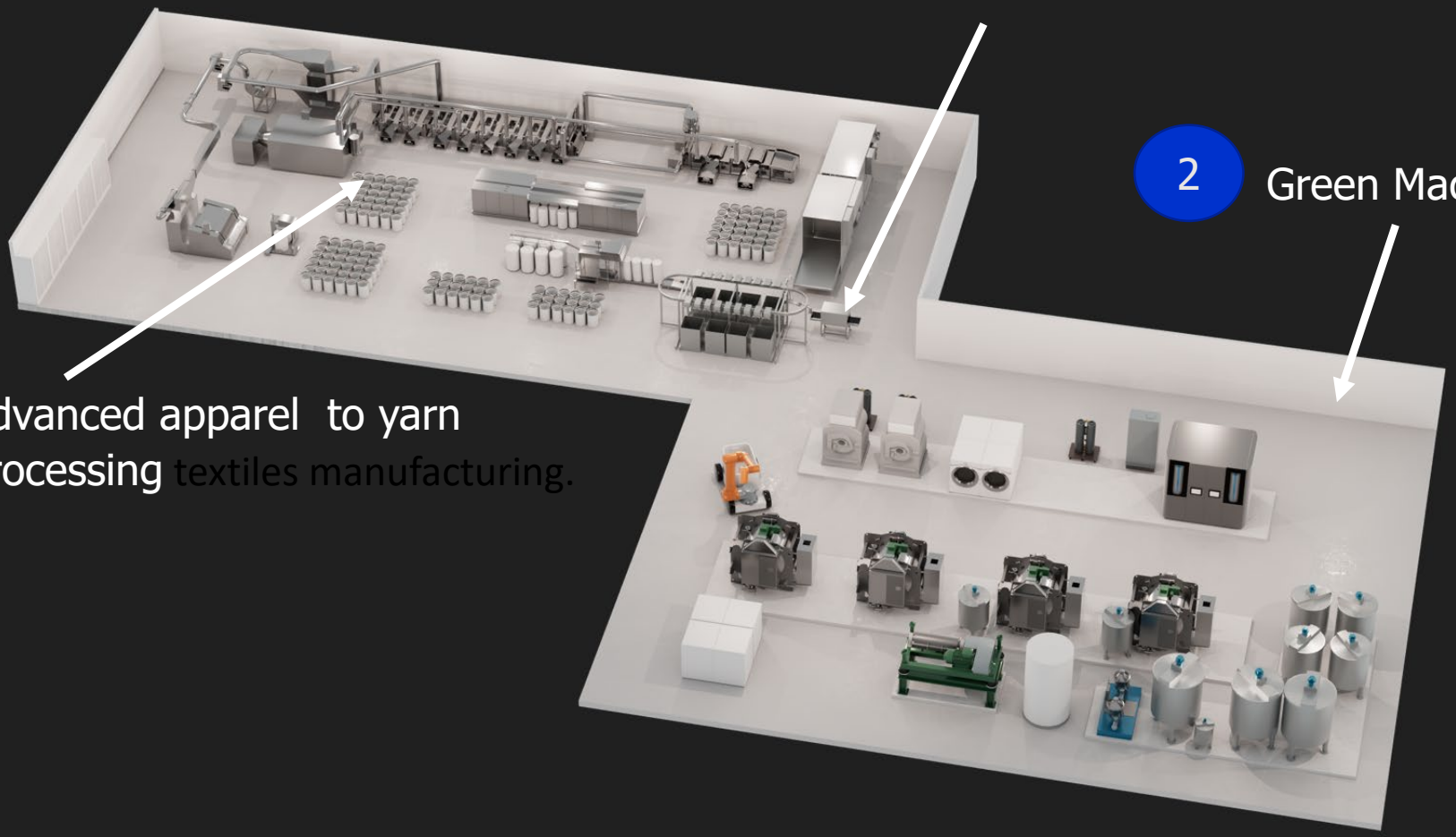
Open Lab: Scaling Existing Solutions Pilot Plant - First End-to-End Blended Textile Upcycling in Hong Kong

1 Smart Garment Sorting System

2 Green Machine 2.0

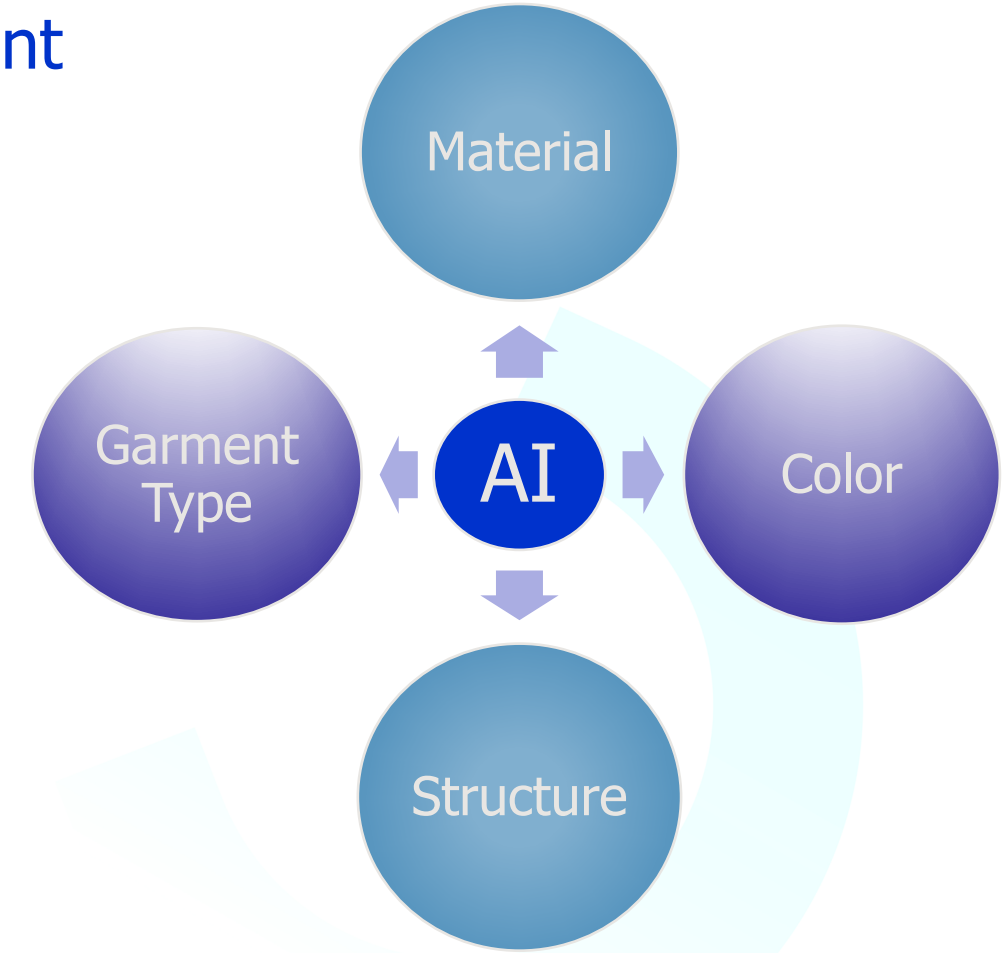
3 Advanced apparel to yarn processing textiles manufacturing.



Open Lab: Scaling Existing Solutions

Pilot Plant – AI-powered Smart Garment Sorting for Recycling

- an automated garment sorting system will be developed to replace labor-intensive and hazardous processes in garment recycling. The system will sort garments from local partners, allowing reusable items to be identified and separated for resale. PET-cotton garments can then be directed to the PET-cotton blended textile upcycling system.



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Continous Performance improvement with AI

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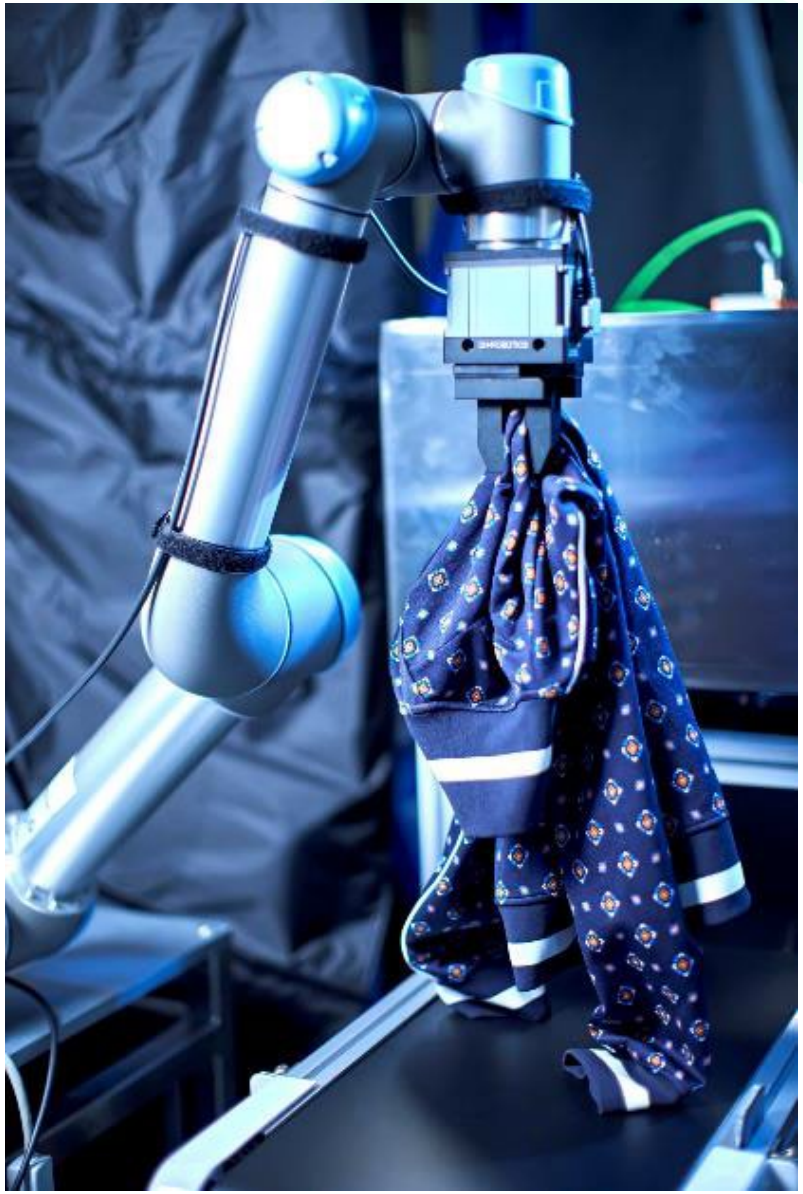

	VGG19 (16 cats)
Accuracy in 16 type of garment recognition ~ 90% accuracy in < 1 Sec	Trousers: 93% Shirt: 92% T-shirt: 86% Jacket: 91% Dress: 88% Sweater: 82% Blouse: 73% Skirts: 85% Polo-shirt: 74% Jeans: 91% Tank-top: 81% Scarf: 94% Shorts: 73% Hoodie: 86% Cardigan: 98% Hat: 100%

Our Textile Materials Database

Core materials
CTN:1.0
PET:1.0
Nylon:1.0
Viscose:1.0
Wool:1.0
Wool:0.98
PU:1.0
Polyamide:0.98
Leather:1.0
Rayon:1.0

Content 1	Content 2
Wool:0.99	Spandex:0.01
Spandex:0.2	Polyamide:0.8
Spandex:0.15	Polyamide:0.85
Spandex:0.1	Rayon:0.9
Spandex:0.05	Polyamide:0.95
Spandex:0.05	Rayon:0.95
PU:0.1	Polyamide:0.9
Rayon:0.5	Linen:0.5
Rayon:0.45	Linen:0.55
Rayon:0.4	Linen:0.6

Content 1	Content 2
Viscose:0.95	Spandex:0.05
Viscose:0.9	Spandex:0.1
Viscose:0.85	Polyamide:0.15
Viscose:0.8	Polyamide:0.2
Viscose:0.75	Linen:0.25
Viscose:0.65	Polyamide:0.35
Viscose:0.45	Acetate:0.55
Viscose:0.45	Linen:0.55
Viscose:0.3	Wool:0.7

200+ materials

> 90% accuracy in < 1 Sec

Content 1	Content 2
Nylon:0.9	Spandex:0.1
Nylon:0.85	Spandex:0.15
Nylon:0.85	Lycra:0.15
Nylon:0.8	Spandex:0.2
Nylon:0.8	Lycra:0.2
Nylon:0.7	Wool:0.1
Nylon:0.55	Viscose:0.45
Nylon:0.45	Rayon:0.55
Nylon:0.3	Wool:0.7
Nylon:0.3	Rayon:0.7
Nylon:0.25	Rayon:0.75
Nylon:0.2	Viscose:0.8
Nylon:0.2	Wool:0.8
Nylon:0.15	Viscose:0.85
Nylon:0.1	Wool:0.9

Content 1	Content 2
CTN:0.99	Spandex:0.01
CTN:0.98	Viscose:0.02
CTN:0.98	Spandex:0.02
CTN:0.95	PET:0.05
CTN:0.95	Nylon:0.05
CTN:0.95	Viscose:0.05
CTN:0.95	Spandex:0.05
CTN:0.95	Lycra:0.05
CTN:0.95	PU:0.05
CTN:0.9	PET:0.1
CTN:0.9	Spandex:0.1
CTN:0.9	Lycra:0.1
CTN:0.85	PET:0.15
CTN:0.8	PET:0.2
CTN:0.8	Nylon:0.2
CTN:0.8	Viscose:0.15
CTN:0.75	PET:0.25
CTN:0.7	PET:0.3
CTN:0.7	Nylon:0.3
CTN:0.7	Viscose:0.3
CTN:0.65	PET:0.35
CTN:0.65	Nylon:0.35
CTN:0.6	PET:0.4
CTN:0.6	Rayon:0.4
CTN:0.6	Linen:0.4
CTN:0.55	PET:0.45
CTN:0.55	Nylon:0.4
CTN:0.55	Linen:0.45
CTN:0.5	PET:0.5
CTN:0.5	Viscose:0.5
CTN:0.5	Rayon:0.5
CTN:0.5	Linen:0.5
CTN:0.45	PET:0.55
CTN:0.45	Linen:0.55
CTN:0.35	PET:0.65
CTN:0.35	Viscose:0.65
CTN:0.3	PET:0.7
CTN:0.3	Wool:0.7
CTN:0.25	PET:0.75
CTN:0.2	PET:0.8
CTN:0.15	PET:0.85

Content 1	Content 2
PET:0.98	Spandex:0.02
PET:0.95	Nylon:0.05
PET:0.95	Spandex:0.05
PET:0.95	PU:0.05
PET:0.9	Spandex:0.1
PET:0.9	PU:0.1
PET:0.85	Spandex:0.15
PET:0.85	Linen:0.15
PET:0.8	Rayon:0.2
PET:0.7	Viscose:0.3
PET:0.7	Rayon:0.3
PET:0.65	Viscose:0.35
PET:0.65	Rayon:0.35
PET:0.55	Nylon:0.45
PET:0.55	Wool:0.45
PET:0.5	Viscose:0.5
PET:0.5	Wool:0.5
PET:0.5	Rayon:0.5
PET:0.45	Wool:0.45
PET:0.45	Rayon:0.55
PET:0.45	Linen:0.55
PET:0.4	Viscose:0.6
PET:0.4	Wool:0.6
PET:0.4	Rayon:0.6
PET:0.35	Rayon:0.65
PET:0.3	Viscose:0.7
PET:0.3	Rayon:0.7
PET:0.25	Rayon:0.75

Open Lab: Scaling Existing Solutions

Pilot Plant – Green Machine 2.0

- New technologies at industrial scale.
- demonstrate our flagship technology, Green Machine, at scale – to separate and recycle waste from PET-cotton blends, transforming them into new products.
- autonomous robotic system for material handling.
- Heat and wastewater recovery systems
- Microplastic and other pollutant separation using “Accousweep” system

OUR GOAL: reduced energy use, zero discharge

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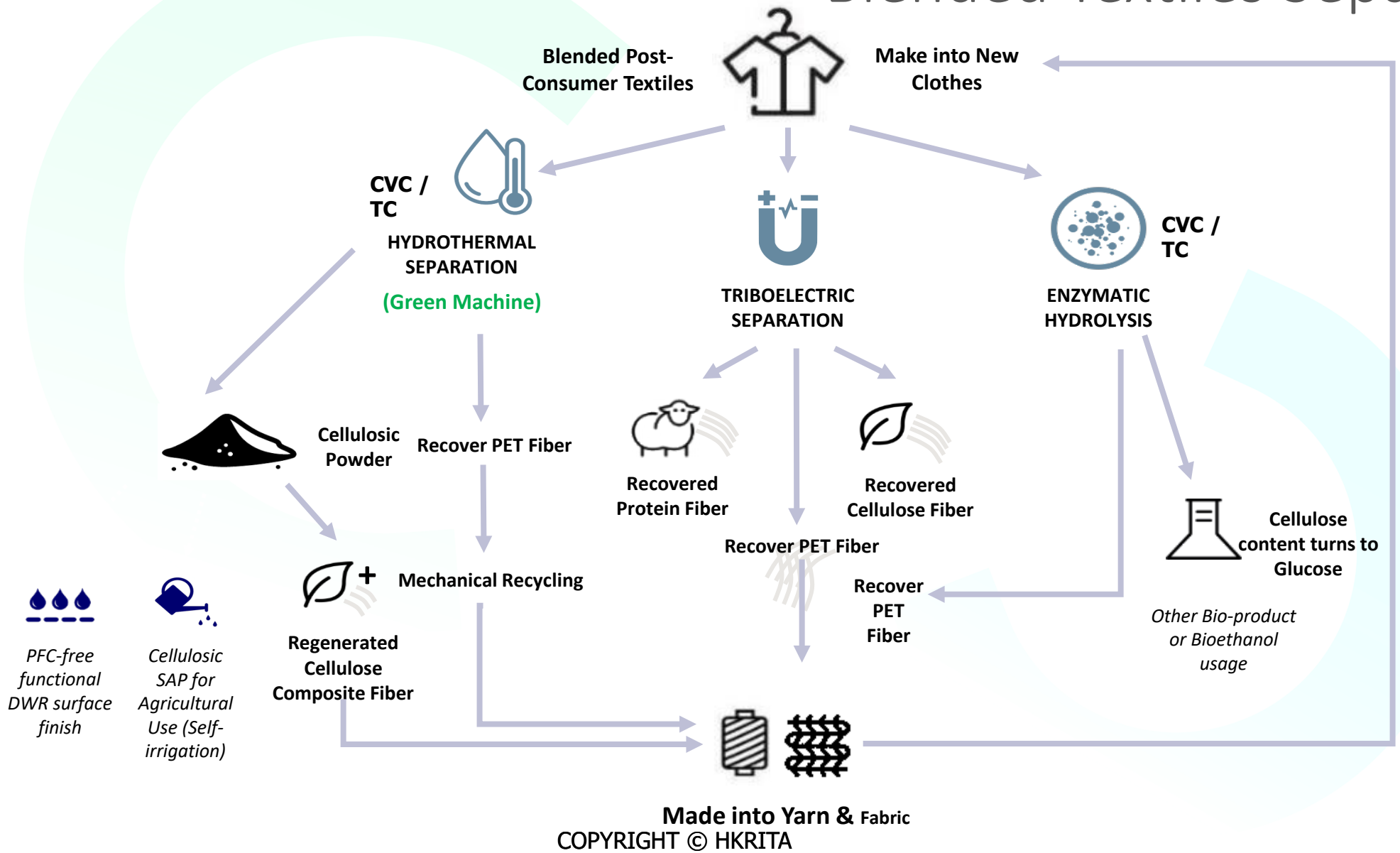
HKRITA – Textile Recycling Technologies
Blended Textiles Separation



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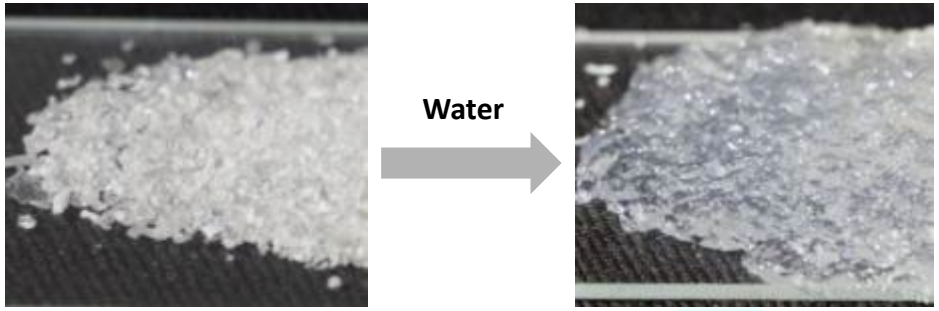
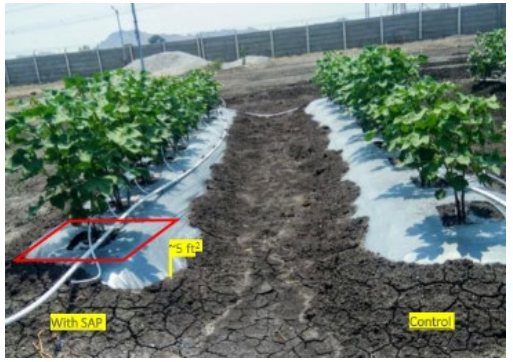
Cellulosic Superabsorbent Polymer (SAP)

Turning the cellulose powder recovered into superabsorbent polymer (SAP) to be used as a biodegradable, water retaining aid for cotton plantation.

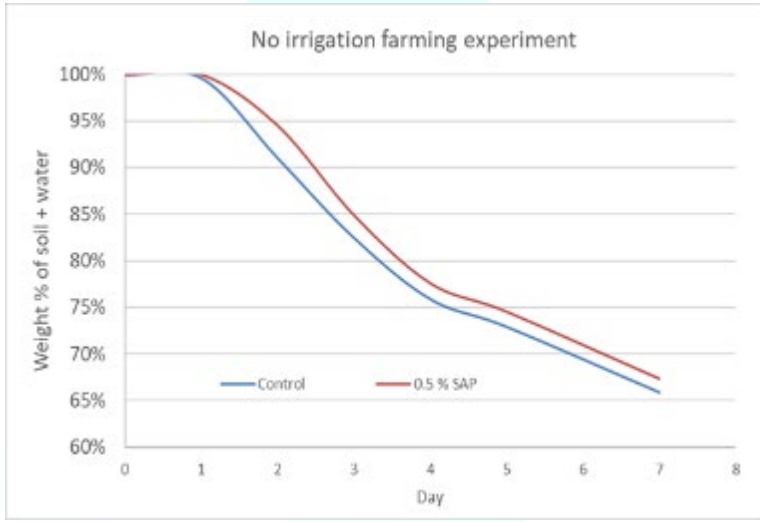
- SAP made from cellulosic powder is with liquid absorption capacity 31.4 (g saline solution material) and liquid retention capacity 26.6 (g saline solution/ g material)
- Preliminary experiment shows higher growth rate and yield for cotton plant with SAP applied without additional irrigation
- Introducing fertilizer (NPK) into the cellulosic SAP - fertilizer will be released with water for better yield



SAP made from Cellulose recovered by Hydrotherma l Separation system



Cotton plantation experiment with Cellulosic SAP in Karnataka, India



Better soil water retention with SAP applied

Open Lab: Inspire to Impact

Fashion Future Lab

- a dynamic space showcasing emerging and forward-thinking ideas from researchers, partners, research institutes, start-ups and NGOs
- the future showcase encompasses emerging innovations like bio-material and microplastic management, and is open to collaboration
- initial showcase will feature the concept of “Farm-to-Garment” through innovative technology, showcasing a location-independent supply chain, where cotton will be grown, spun into yarn and further produced into garment.

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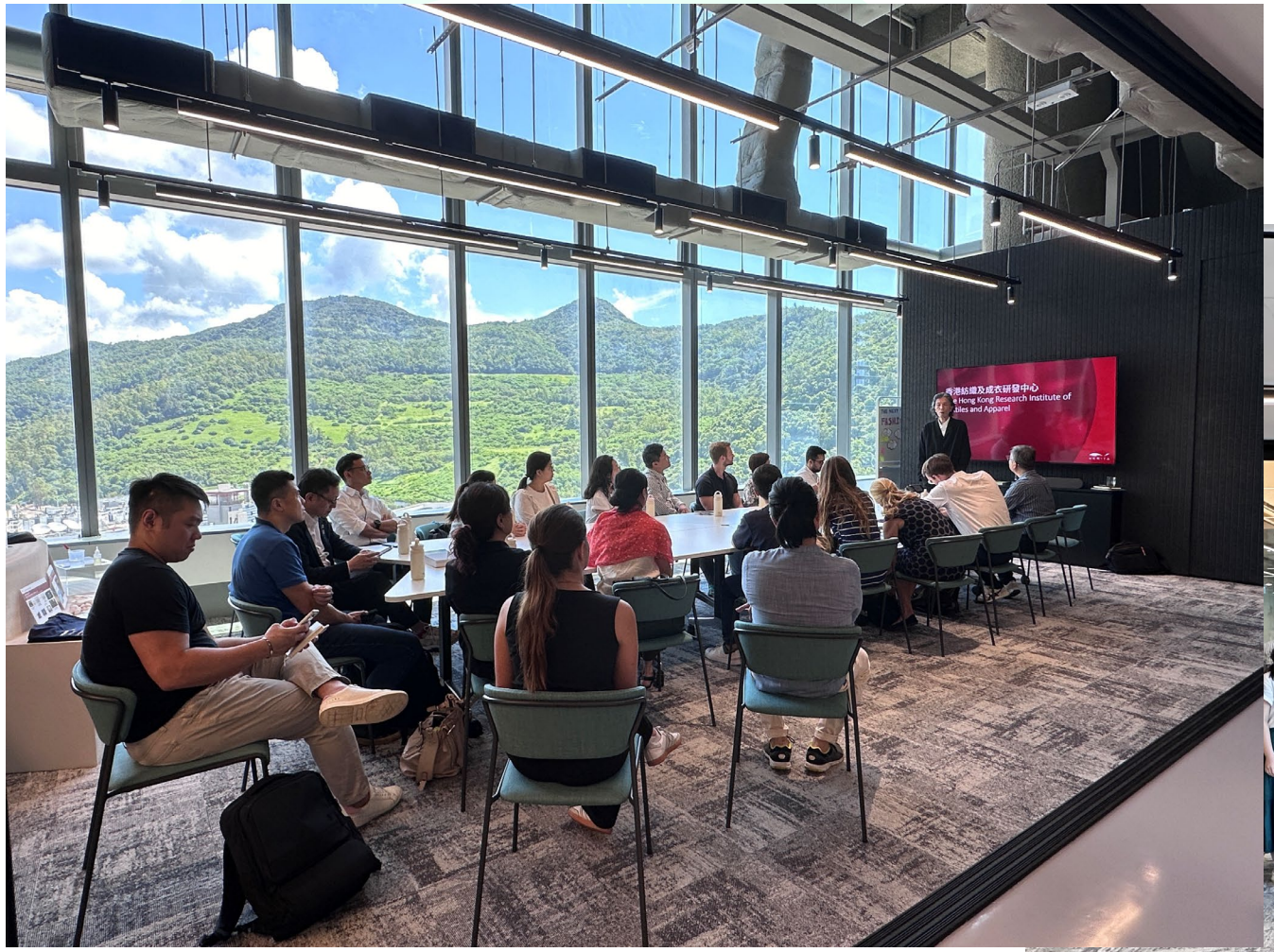

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MAD
PILOT PLANT
創研坊
Acousweep
PILOT PLANT
創研坊
Water
Recycling
System
水循環系統
PILOT PLANT
創研坊
PET Fibre
Decolouring
聚酯纖維脫色

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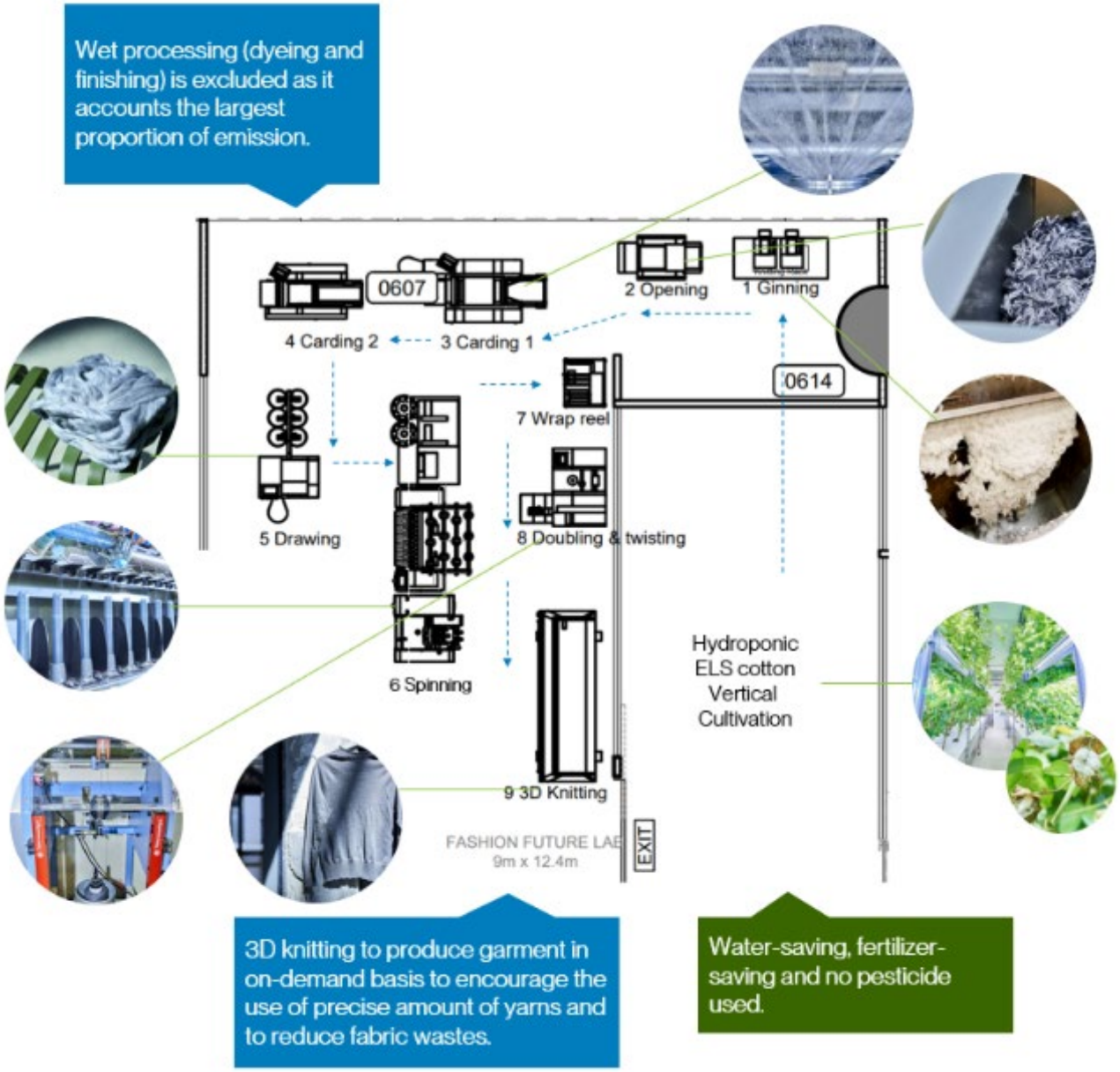
Farm-to-Garment

Packing all steps in a single space, Farm-to-Garment makes the cotton supply chain short and reduces GHG emission and waste in each step.



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