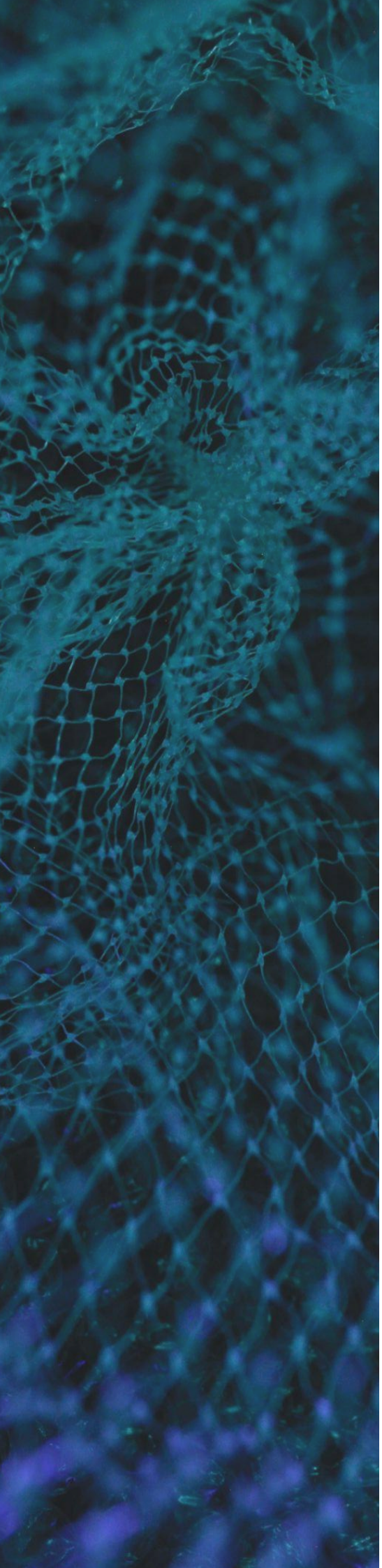


# A DIGITAL TRACEABILITY PLATFORM ANALYSIS

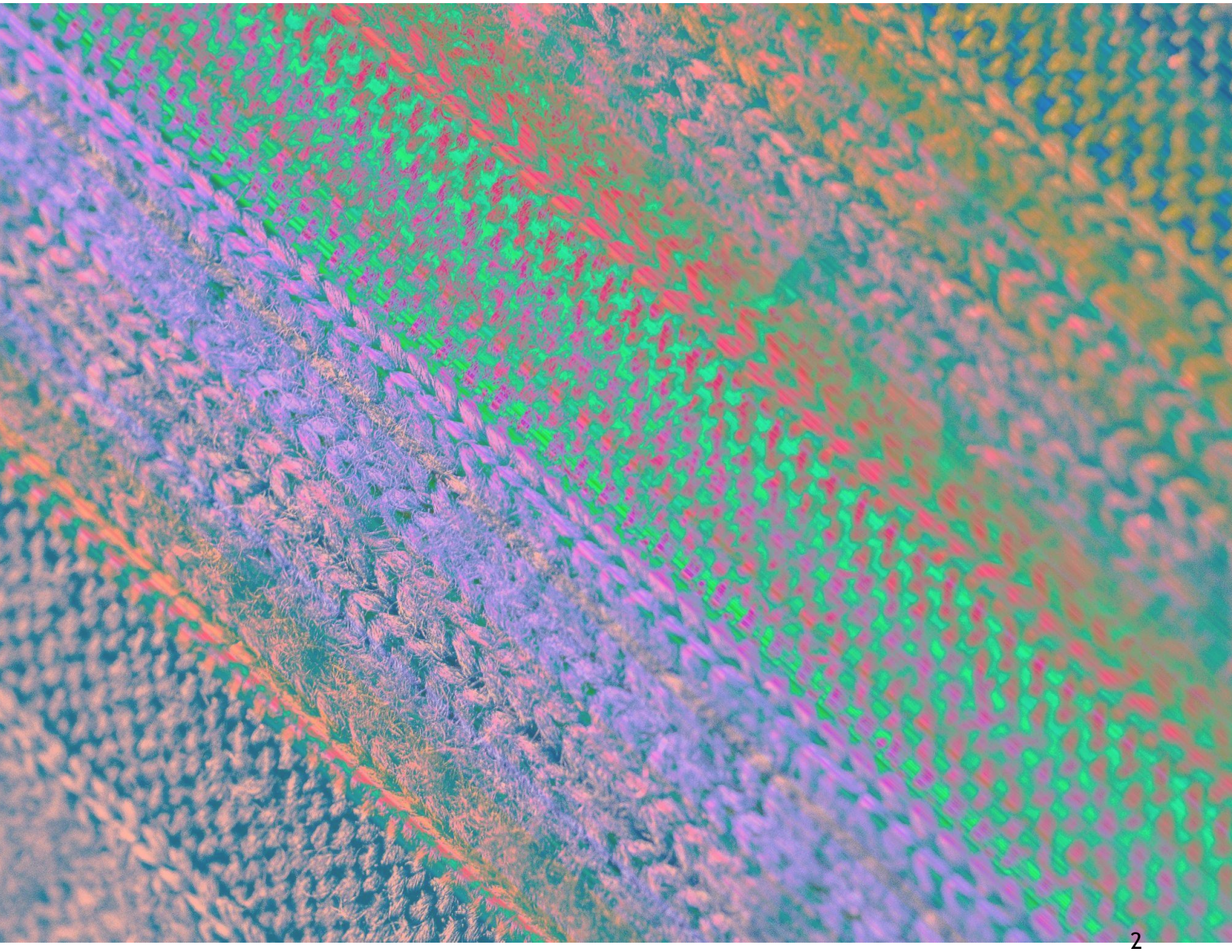
Benchmarking supply chain and circularity digital solutions in the fashion industry

# PREFACE

This document aims to provide a comparative analysis of the existing digital traceability platforms available in the fashion industry, as well as guidance on strategy and surrounding implementation. Providing insights to inform a partner's view on which solution to choose given an organisation's environmental, social, and governance (ESG) requirements, use cases, and scope.

The analysis will help:

- Digest the landscape of digital traceability platforms
- Understand reasons for use, and their capabilities e.g. traceability approaches, fibre use cases, interoperability



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# ACKNOWLEDGEMENTS


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### ACKNOWLEDGEMENTS

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# DISCLAIMER

### ANALYSIS BASED ON CLAIMS MADE

Comment and analysis is built on claims and information provided by the digital traceability companies themselves. Fashion for Good did not proof-test the operational performance and capabilities. This was strictly a desktop landscape analysis. Therefore qualitative and qualitative analysis, aggregations, graphs and tables of this report have relied on truthful responses by the representatives of the digital traceability companies themselves, and are subject to continual change, updates, and modification.

# EXECUTIVE SUMMARY

Fashion for Good researched and interviewed 36 digital traceability companies via questionnaires and fill out spreadsheets, creating a benchmark analysis to understand their focus areas, use cases, and scope. This report is the first step to guide partners to identify which digital traceability platform is best for their sustainability needs. With the overall aim to accelerate the scaling and integration of such platforms within the operations of our brand partners.

Based on their capabilities and supply chain scope of focus, Fashion for Good groups digital traceability platforms in two distinct categories:

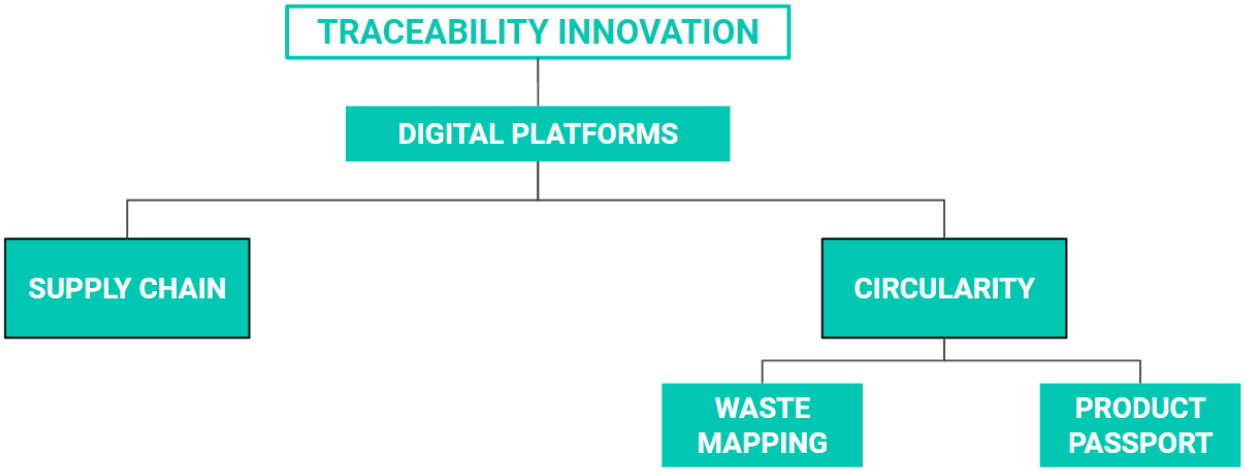



**FIGURE 1: THE TWO CATEGORIES OF DIGITAL TRACEABILITY PLATFORMS.**

## SUPPLY CHAIN TRACEABILITY PLATFORMS (SCTP)

- Supplier mapping
- Fibre, material, and product traceability

## CIRCULARITY PLATFORMS

- Product Passports
  - Digitising finished products for engagement into the circular economy
- Waste Mapping
  - Matchmaking textile waste between sellers and buyers[1]

[1] These use cases are the main points of focus for innovators within these categorisations, however these focus points are not the limits of their capabilities (see FIGURE 10).

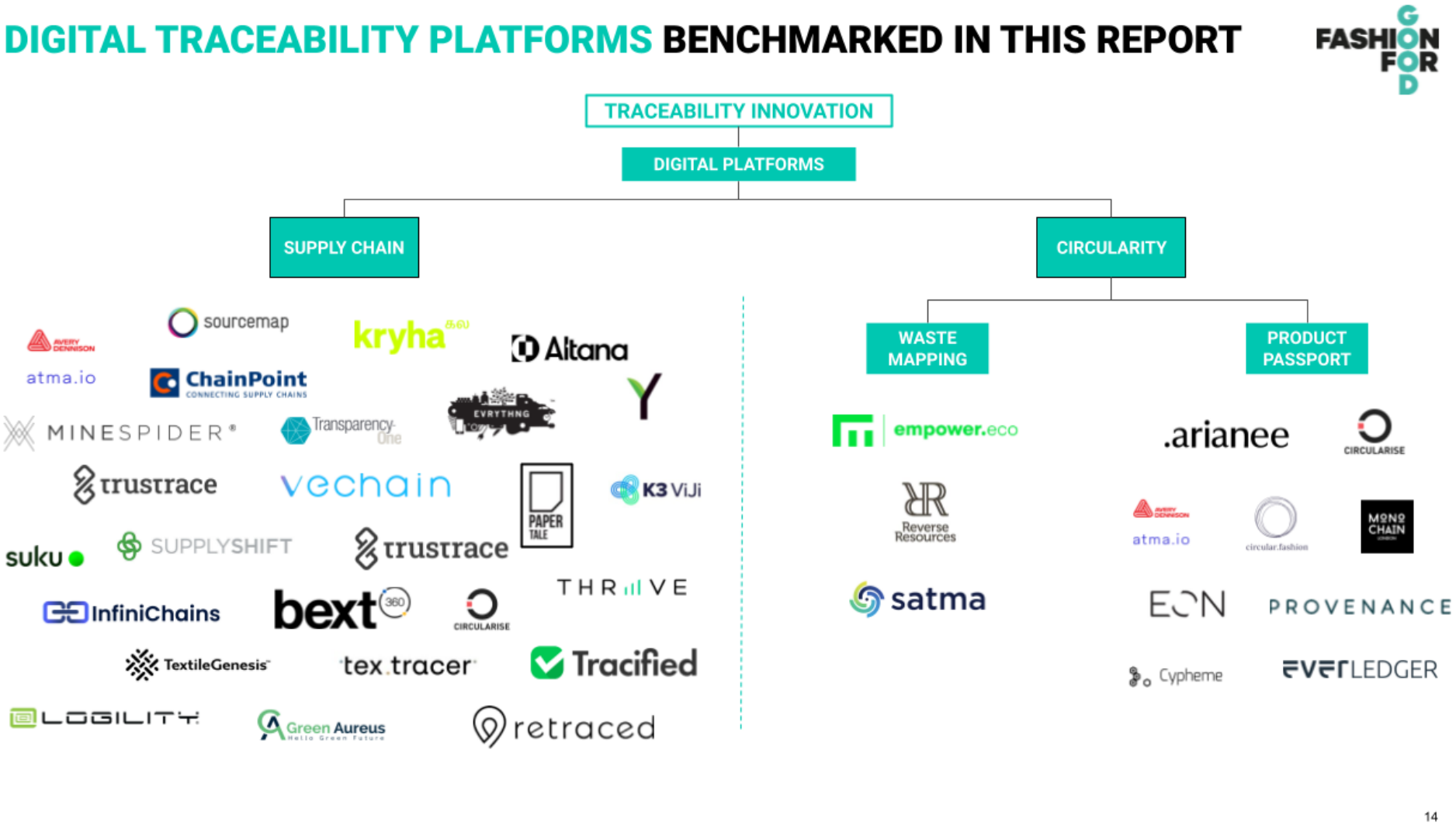



**FIGURE 2: DIGITAL TRACEABILITY PLATFORMS ANALYSED AND BENCHMARKED IN THIS REPORT.**

# SUPPLY CHAIN TRACEABILITY PLATFORMS (SCTP)

**WHAT ARE SUPPLY CHAIN TRACEABILITY PLATFORMS?**

Cloud-based or blockchain solutions that improve supply chain data integrity and verification by providing digital supply chain mapping and visualisation tools, while performing material, batch, and product traceability, facility profiling and risk analysis.

**KEY REASONS TO USE SUPPLY CHAIN TRACEABILITY PLATFORMS:**

- Product certification integrity and management
- Supply chain mapping and facility profiling
- Real-time product tracking
- To meet incoming supply chain due diligence legislation
- Corporate climate action: to measure and meet supply chain emission targets
- To meet consumer demand for transparency of a product manufacturing, working conditions, and impact
- Strengthen brand reputation
- Secures brand reputation against supply chain compliance risks and unauthentic claims
- Lower compliance fatigue and costs
- Attract ESG-minded investors

**FIBRE-FORWARDS VS GARMENT-BACKWARDS: TWO MAIN TRACKING APPROACHES FOR SCTP**

A **garment-backwards** approach (also known as “top down” or “cascading tracing”) refers to creating visibility of the supply chain from a brand's operations, usually mapping the supply chain backwards using the Purchase Order (PO) data point as scope and reference. This approach relies on requests for data declarations made by facilities about their suppliers (and their suppliers thereafter), providing historical data which is delayed behind the movement of orders, making it difficult to verify and match digital inventory records with physical inventory flow. This approach should be practised at the start of the supply chain mapping journey, an essential direction for larger brands with minimal visibility of their facilities beyond Tier 1.

A **fibre-forwards** approach (also known as “bottom up”) refers to tracking physical inventory of fibres, materials, and products in real-time, and at an item, SKU, and/or batch level. This method uses blockchain technology for data security and immutability by creating a digital 'twin', digital token, or “e” token (different terms, similar functionality and use cases), and can be implemented if the supplier engagement has already been made between brand and facility. This approach should be practised by users more advanced in their traceability journey, aiming for more efficient and authenticated product certification management, material verification, and inventory visibility higher in their supply chain.

**VOLUME RECONCILIATION AND WASTAGE FACTOR MODELLING:TWO UNIQUE CAPABILITIES**

**Volume reconciliation** is having the ability to indicate if the output of a product sold from a facility breaches its production capacity. This rests on the capability of material weight composition validation: validating that the output weight of a product (e.g. yarn) matches the input of a product (e.g. fabric roll) at the next manufacturing step and between product combinations. This ensures that digital inventory records match correctly with physical inventory flow between suppliers and buyers. This is needed to identify suppliers selling beyond their production capacity for conventional and preferred fibres, and through the similar calculations juggling input and output data, enables wastage factor modelling.

**Wastage factor modelling** is having the capability to automatically calculate the amount of wasted fibre/yarn/material between product combinations and manufacturing processes. This is useful for industry players wishing to map and allocate textile waste at various manufacturing stages.

**INTEROPERABILITY: INTEGRATE OR YOU'LL FALL BEHIND**
All SCTP's have Application Programming Interface (API) capabilities to sync with legacy brand systems such as SAP and PLM suites.

**INTERACTION WITH SUSTAINABILITY STANDARDS**
Looking to the future, a key criteria for service providers to have, or to look into having, is automated mechanisms to verify product certification with sustainability standards and affiliated third party certification bodies.

**INTERACTION WITH PHYSICAL TRACER TECHNOLOGIES: DIGITAL AND PHYSICAL TRACEABILITY MEET**
The majority of SCTPs claim they are capable (or are looking into collaborations) with physical tracer technologies[2] to add physical verification alongside site and transactional verification. Many claim they can integrate physical tracer detection and audits on their systems, and be "tracer agnostic".

# CIRCULARITY PLATFORMS

There are two types of Circularity Platforms defined in the Fashion for Good Traceability landscape:

1. Product Passports
2. Waste Mapping

**PRODUCT PASSPORTS**
Product Passports are used to track, trace, and communicate information related to a finished product. They are also used to create digital product passports to communicate product information and engage consumers and circulators within circular market spaces. This suits brands who wish to implement post-gate traceability to guide:

- Circular business models[3]
    - Recommerce
    - Resale
    - Repair
    - Sorting and recycling operations
- Anti-counterfeiting
    - NFT product passports to protect brand identity for re-commerce

**WASTE MAPPING**
Waste Mapping is in high demand and scaling at a fast pace due to industry wide demand to source and recycle textile waste. These platforms perform waste management inventory control and matchmaking to connect fashion brands, manufacturers, sorters, collectors and recyclers who are seeking to either sell or buy material feedstock. Similar to SCTPs, they use cloud-based solutions, but focus on creating digital infrastructures to matchmake networks of industry players.

[2] See The Textile Tracer Assessment (an analysis and user guide for physical tracer technologies in the textile industry)
[3] Please refer to the circular business model landscape on the Fashion for Good partner portal for more information on circular business models.

## CONCLUSION:

With many motivations for improving the integrity of supply chain data, textile waste mapping, and product digitisation, an essential step for the brand is to define traceability objectives first in order to match use cases with the capabilities of solutions benchmarked in this report (See FIGURE 10, 11, 14.). The combination of defining internal traceability strategy, with the guidance of this report, should lead to talks with the right digital traceability platforms to meet future sustainability objectives. This report guides traceability implementation through understanding problem statements, key business cases, and performance criteria of the solutions.

# GLOSSARY

| ACRONYM | DEFINITION |
|---|---|
| ERP | **Enterprise Resource Planning** refers to a type of software that organisations use to manage day-to-day business activities such as accounting, procurement, project management, risk management and compliance, and supply chain operations.[4] |
| ESG | **Environmental, Social and Governance** (ESG) refers to a collection of corporate performance evaluation criteria that assess the robustness of a company's governance mechanisms and its ability to effectively manage its environmental and social impacts.[5] |
| FOB | **Free On board or Freight On board** and is a designation that is used to indicate when liability and ownership of goods is transferred from a seller to a buyer |
| NFC | **Near-Field Communication (NFC)** is the ultimate in connectivity. With NFC, you can transfer information between devices quickly and easily with a single touch—whether paying bills, exchanging business cards, downloading coupons, or sharing a research paper.[6] |
| NFT | **Non-Fungible Tokens (NFT)** are unique cryptographic tokens that exist on a blockchain and cannot be replicated. NFTs can represent real-world items like artwork and real estate. "Tokenising" these real-world tangible assets makes buying, selling, and trading them more efficient while reducing the probability of fraud.[7]. |
| PLM | **Product Lifecycle Management** systems product lifecycle management (PLM) is the strategic process of managing the complete journey of a product from initial ideation, development, service, and disposal. Put another way, PLM means managing everything involved with a product from cradle to grave.[8] |

[4] Enterprise Resource Planning definition
[5] Environmental, Social and Governance definition
[6] Near Field Communication definition
[7] Non-Fungible Tokens definition
[8] Product Lifecycle Management definition

| | |
|---|---|
| RFID | **Radio Frequency Identification** is a technology that uses radio waves to passively identify a tagged object. It is used in several commercial and industrial applications, from tracking items along a supply chain to keeping track of items checked out of a library[9]. |
| rPET | **Recycled polyester.** |
| SBTi | **Science Based Targets initiative**[10] |
| SCTPs | **Supply Chain Traceability Platforms** are blockchain or cloud-based digital platforms that consolidate supply chain data, provide supply chain mapping and visualisation tools, and perform material and product traceability. |
| VMS | **Vendor Management System** is an internet-enabled, often Web-based application that acts as a mechanism for business to manage and procure services and orders.[11] |

| TERM | DEFINITION |
|---|---|
| CHAIN OF CUSTODY | Refers to the ability to trace the change in (legal) ownership of the product as it's transformed along the supply chain.[12] |
| CERTIFICATION BODIES | Third party organisations carrying out audits to verify criteria defined by a sustainability standard. |
| FASHION READINESS | An indication of the level of maturity and commercial availability a tracer technology has for implementation into the fashion and textile supply chain (from a Fashion for Good perspective). See within the report for further criteria. |
| PHYSICAL VERIFICATION | Authenticates the presence of certified material in a product.[13] |
| SITE VERIFICATION | Verifies that the processes carried out at site conform to operational and/or sustainability criteria defined by the standard.[14] |
| THE USER | The "User" refers to an organisation who are implementing the tracer technology in their operations. This can potentially be various fashion ecosystem stakeholders e.g. suppliers, manufacturers, brands, retailers, sustainability programmes, and certification bodies that hold motivations to explore and implement tracer technologies to supplement existing fibre traceability in the textile supply chain. |

[9] Radio Frequency Identification definition
[10] https://sciencebasedtargets.org/
[11] Vendor Management System definition
[12] Chain of custody definition
[13] https://textileexchange.org/tetrackit/
[14] https://textileexchange.org/tetrackit/

| | |
|---|---|
| CLAIMS MADE | "Claims' or "claims made" in this report refer to the information provided by the digital traceability companies, regarding the enquiry topics. They do not refer to sustainable product claims of certification. |
| FIBRES/MATERIALS | Fibre types and textile materials are at times referred interchangeably in this report when talking of physical traceability verification. |
| TIER 1 | Garment producers. |
| TIER 2 | Fabric manufacturers. |
| TIER 3 | Spinning facilities. |
| TIER 4 | Raw material extraction. |
| TRANSACTION VERIFICATION | Verifies that the products and quantity exchanged along the value chain is within the certified scope of each site and reconciles to inventory.[15] |

**See also DEFINITION LIST OF CAPABILITIES before FIGURE 10 for more terminology.*

[15] https://textileexchange.org/tetrackit/

# TRANSPARENCY & TRACEABILITY INNOVATION: OVERALL LANDSCAPE

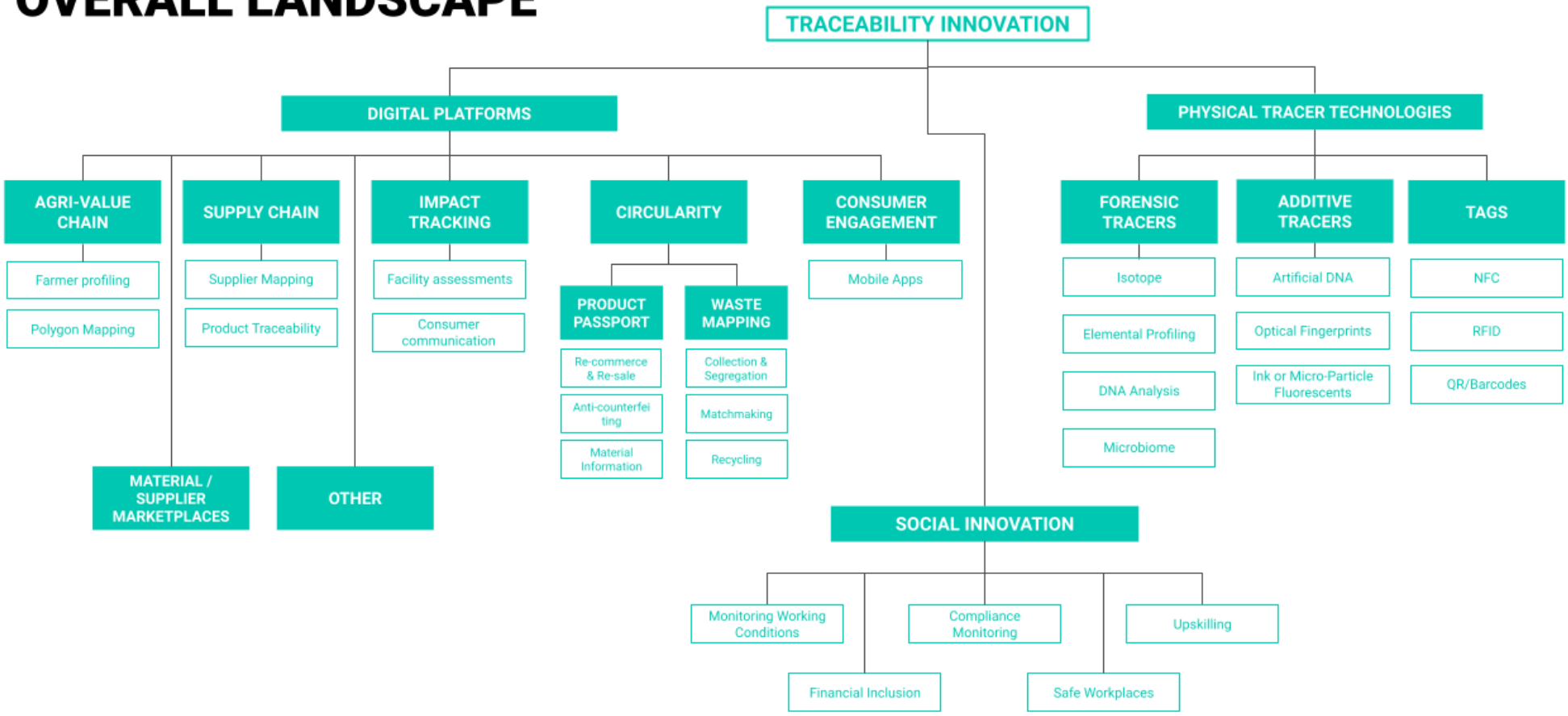



FIGURE 3: FASHION FOR GOOD'S TRANSPARENCY AND TRACEABILITY INNOVATION TAXONOMY (OVERALL LANDSCAPE).

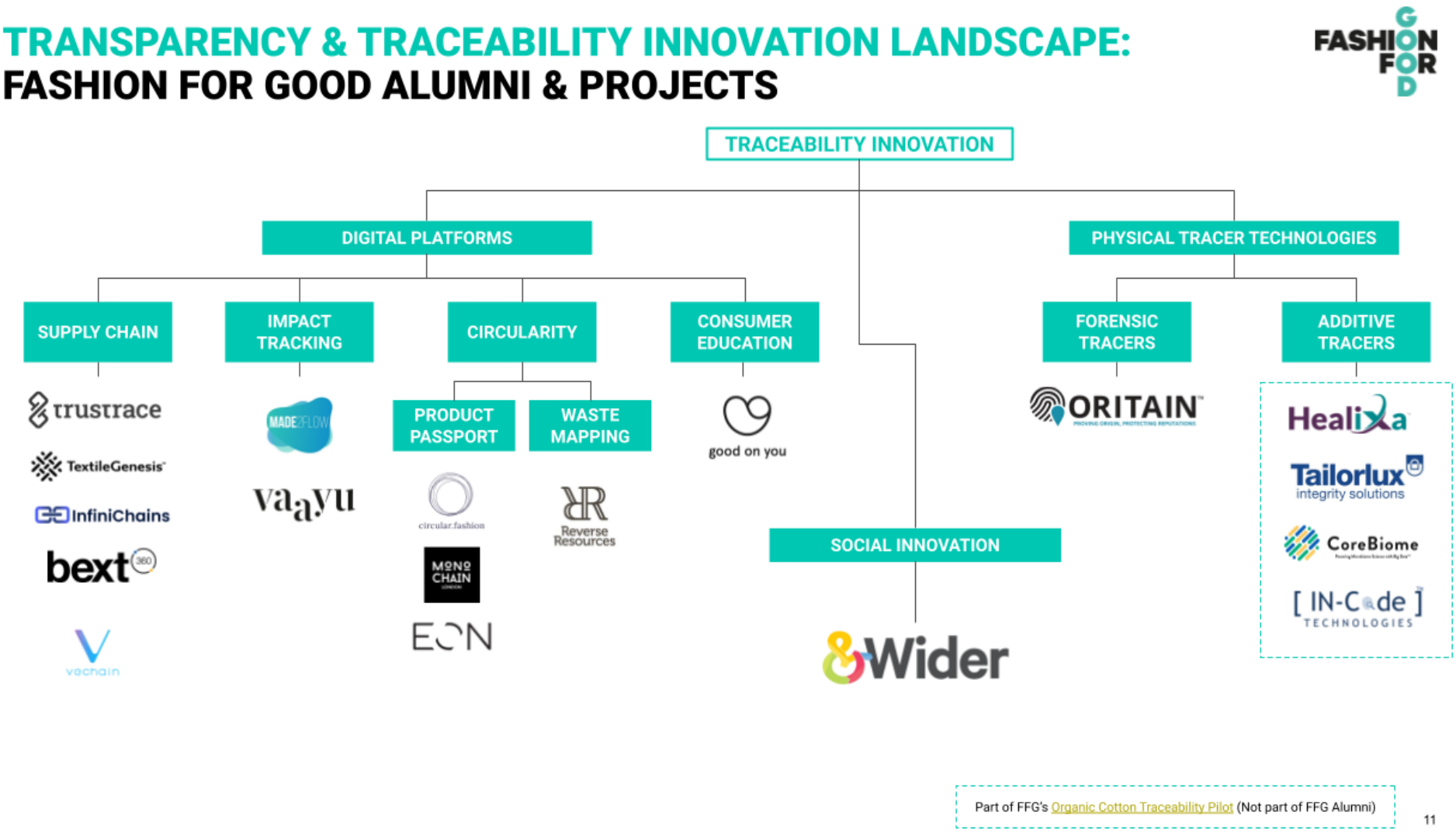



FIGURE 4: FASHION FOR GOOD'S TRANSPARENCY & TRACEABILITY INNOVATION LANDSCAPE (ALUMNI AND PROJECTS).

# PART 1:
# SUPPLY CHAIN TRACEABILITY PLATFORMS

## 1.1: INTRODUCTION

### PROBLEM STATEMENT

#### WHAT IS HAPPENING AT PRESENT AND WHAT ARE THE CURRENT ISSUES:

**LACK OF SUPPLY CHAIN VISIBILITY**
Within the fashion industry, traceability to provide verification of the origin of fibres, materials, and products is lacking. The majority of fashion brands only know their Tier 1 facilities, and visibility and engagement higher in the supply chain (Tier 2 - 4) is absent from their records.

**LACK OF CONFIDENCE IN CHAIN OF CUSTODY**
There is a lack of reliable authentication for fibres, textiles, and finished products. Based on the reliance of unverified chain of custody documentation, current traceability issues include (non-exhaustive):

- False chain of custody claims of sustainability standards, resulting in mistrust between supplier, buyer, and certification relationships.
- Lack of information transparency of supply chain tiers for buyers.
- Sourcing fibres and materials from supply chain and geographic origins with unchecked environmental risk (e.g. deforestation concerns for viscose and leather, monoculture and pesticide intensive practices for cotton, and production impact for petroleum based fibres: polyester and nylon).

#### WHY DON'T CURRENT PRACTICES ADDRESS THE ISSUE?

**DATA IN SILO'S**
Due to the opaqueness and complexity of the fashion supply chain - commodity, financial (FOB), and ESG data sits in siloed areas between various systems and suppliers. This results in a lack of end-to-end supply chain visibility and makes product life cycle data difficult to manage. Usual practices see facilities only providing transaction data (product description, weight, cost, certifications, inventory management) with little focus on surrounding ESG credentials for that facility, workers conditions, and material impact.

**SUSTAINABILITY STANDARDS TAKE THE FIRST STEPS**
Chain of custody requirements by sustainability standards (e.g. GOTS[16], BCI[17], Textile Exchange[18]) pushed the ESG agenda in the fashion supply chain, requiring the verification of sustainability criteria and processes in order for the end product to be certified and hold a sustainable product claim.

[16] Global Organic Textile Standard
[17] Better Cotton Initiative
[18] https://textileexchange.org/standards/

This sustainable claim is exchanged via scope certificates authenticating practices at the site of origin and/or manufacturing (also known as site verification).

However, scope certificates relating to an incoming order are only needed from the previous supplier that a stakeholder is buying from (e.g. a brand or retailer only needs scope certificates from their Tier 1 supplier). This shows a positive step for demanding ESG traceability for a brand/retailer, however it does not demand complete end-to-end traceability from Tier 4. Industry wide these chain of custody requirements are being re-evaluated. See Textile Exchange's to understand further how certification, compliance, and traceability verification methods

Separate to sustainability standards and product certification, incoming legislation, alongside science based targets, and shifting consumer preferences, are demanding transparency further up the supply chain via ESG due diligence disclosures.

## WHY CHANGE IS NEEDED

- Effective and incoming legislation (predominantly in sourcing countries) to focus on environmental and social/human impact due diligence, visibility and remediation.
- Brands aiming for national and international science-based climate targets as well as structuring corporate responsibility governance internally within their businesses for their scope 3 supply chain[19].
- Consumers' growing demand for better transparency and traceability understanding, to know who made the products they buy, and where they were sourced.

These shifts have shaped the focus on transparency and therefore traceability, overall triggering a change of focus in the industry. Industry players increasingly want to provide traceability verification of the geographic origin, supply chain provenance, and associated ESG criteria for fibres, materials, and facilities they source from.

## KEY BUSINESS CASES FOR SUPPLY CHAIN TRACEABILITY PLATFORMS

The following are key reasons/use cases for a supply chain traceability platform:

- **Product certification integrity and management**
    - Providing digital traceability by housing transaction certificates (transactional verification) and scope certificates (site verification), verifying authenticity of sustainability standards at facility and material level (e.g. GOTS, OCS).
- **Supply chain mapping and facility profiling**
    - Facility profiling
    - Audit assessments supply chain discovery
    - Supplier risk assessments
- **Real-time product tracking**
    - Digitalising textile assets (fibre, filament, yarn, fabric, garment)
    - Creating a digital 'twin', digital token, or "e" token (different terms, similar functionality and use cases) to mirror the physical flow of goods
- **Legislation**
    - Helping meet incoming supply chain due-diligence legislation
        - EU's Product Environmental Footprint (PEF)[20]
        - EU's Corporate Sustainability Due Diligence (EU CSDD) Directive[21]

[19] Scope 3 typically refers to the supply chain scope defined by the GHG protocol methodology. https://ghgprotocol.org/standards/scope-3-standard)
[20] https://apparelcoalition.org/about-pef/
[21] https://ec.europa.eu/info/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en

        - US's Uyghur Forced Labour Prevention Act (UFLPA)[22]
- **Corporate climate action**
    - Helping bring supply chain visibility for more accurate measuring, reducing, and reporting for emission targets (e.g. Science Based Targets initiative (SBTi))
- **Consumer demand**
    - Providing consumers with better transparency and traceability understanding, to know who made the products they buy, and from where they were sourced.
- **Strengthen brand reputation**
    - Secures brand reputation against supply chain compliance risks and unauthentic claims
- **Lower compliance fatigue and costs**
    - Digital traceability eliminates need for 'offline' spreadsheets/PDF docs for chain of custody § Reduces the compliance effort to share traceability data along the supply chain
- **Attract ESG-minded investors**
    - ESG performance of brands has become a key selection metric for investors

Overall, integrating such a platform consolidates supply chain and chain of custody documentation into a centralised home. This enables better data management of your suppliers ESG credentials, helping meet present and future requirements/legislation as well as track data required for climate commitments.

# FASHION FOR GOOD'S GUIDE TO TRACEABILITY IMPLEMENTATION: APPLY A DIGITAL SOLUTION FIRST

From Fashion for Good's perspective, in order for brands to provide traceability verification of fibres, materials, and products, three pillars (See FIGURE 7) of verification need to be realised and maintained via digital and physical traceability:

## FIRST STEP: DIGITAL TRACEABILITY

**In collaboration with selected supply chain traceability platform:**

- Perform transactional-level[23] verification via product traceability, tracking product journeys either by fibre-forwards or garment-backwards approaches.
- Perform site-level verification by creating visibility and engagement with your supply chain landscape and facilities.

## SECOND STEP: PHYSICAL TRACEABILITY

**In collaboration with selected physical tracer technology:**

- Perform physical/material-level verification of sustainable and preferred fibres.

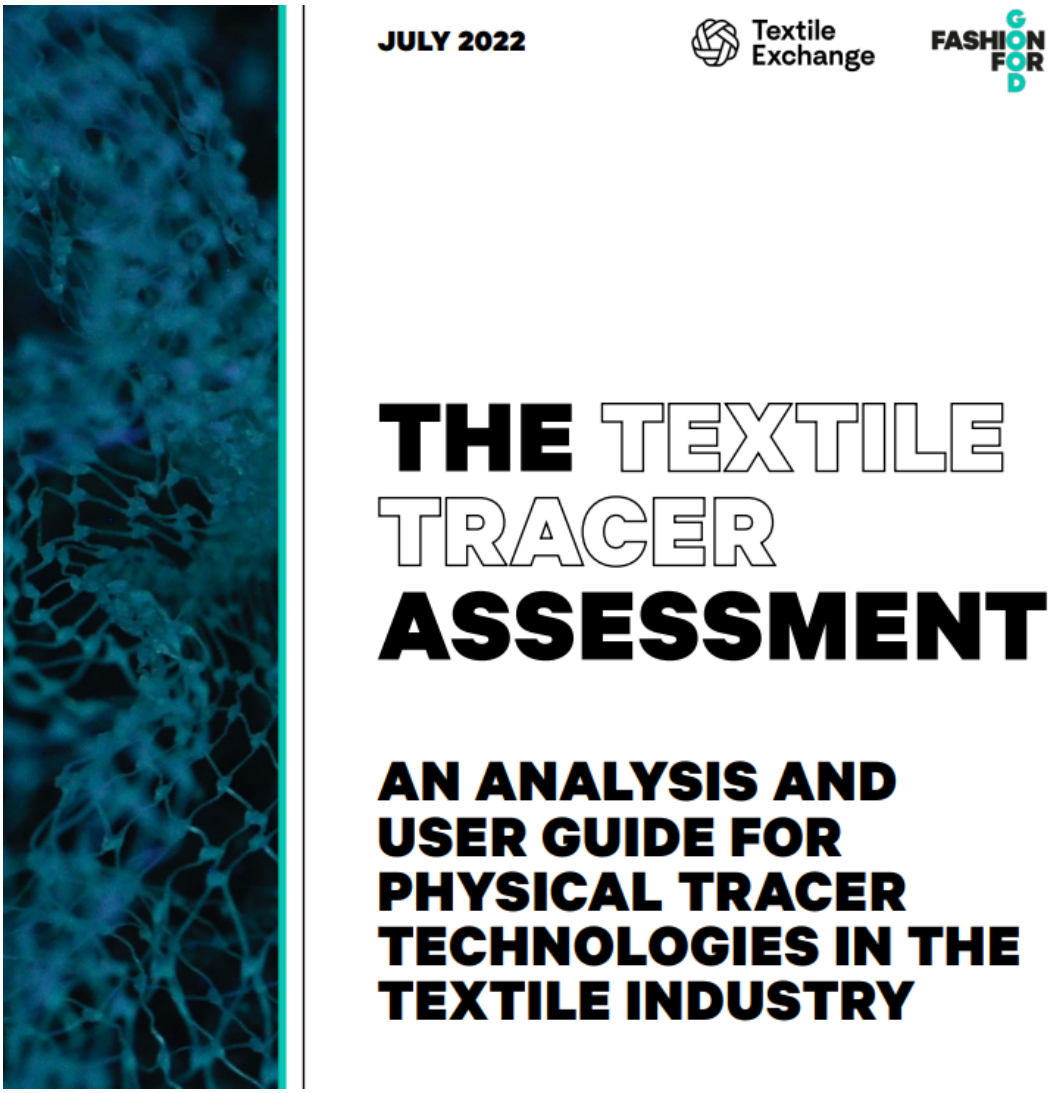
The harmonisation of digital traceability with physical traceability rests on the agnostic and integrative capabilities between supply chain traceability platforms and physical tracer technologies.

[22] https://www.cbp.gov/trade/forced-labor/UFLPA
[23] https://textileexchange.org/tetrackit/

# PHYSICAL TRACEABILITY:
## THE TEXTILE TRACER ASSESSMENT

Following digital traceability comes physical traceability. Here the focus is on physical/material verification to increase traceability confidence for preferred fibres and materials. Implementing a physical tracer technology aims to supplement transaction and site verification for incoming orders.

The Textile Tracer Assessment is a comprehensive overview and user guide designed to accelerate the understanding and implementation of tracer technologies across the fashion and textile supply chain.



# GUIDE TO TRACEABILITY IMPLEMENTATION: PHASE 1 → 3

| | 1ST STEP: DIGITAL TRACEABILITY | | | 2ND STEP: PHYSICAL TRACEABILITY | |
|---|---|---|---|---|---|
| **PHASES** | Phase 1<br>**CONCEPTUALISATION** | Phase 2<br>**INTEGRATION** | | | Phase 3<br>**COMMUNICATION** |
| **FOCUS** | **Defining Traceability Strategy** | **Supply Chain Mapping**<br>*Site level verification* | **Product Traceability**<br>*Transaction level verification* → | **Physical** *verification* | **Communicating Impact** |
| **OVERVIEW** | The initial stage: define ESG traceability motivations, diagnose shortcomings of internal systems, and select tracing innovation to meet verification pillar(s) of focus | In collaboration with selected supply chain traceability platform, create visibility and engagement with your supply chain landscape to perform site verification | In collaboration with selected supply chain traceability platform, track product journeys via transactional verification, either by fibre-forwards or garment backwards approaches | If required, in collaboration with selected tracer technology, perform physical/material verification of preferred fibres and materials | How to effectively communicate verified supply chain information to consumers, shareholders and government bodies |
| **KEY ACTIONS** | **1.1 Define traceability objectives**<br><br>**1.2 Select verification pillars** that meet goals (e.g. transactional, site, and/or material verification)<br><br>**1.3 Assess relevant tracing tech** to meet your use case(s) and *move to Phase 2* | 2.1 Select T&T digital platform<br>- Define stakeholders and accountability<br>- Existing systems in place and shortcomings?<br><br>2.2 Supply chain discovery and mapping - same digital platform can be used<br><br>2.3 Facility profiling and audit assessments and supply chain risk assessment | 2.4 Select T&T digital platform<br><br>2.5 Product journey mapping<br><br>2.6 Product certification management | 2.7 Select tracer technology<br><br>2.8 Isolate product journeys that you want additional physical/forensic verification<br><br>2.9 Map stakeholder roles and responsibilities for implementation - define trainings<br><br>2.95 Integrate tracer technology with T&T digital platform and internals systems | 3.1 Consumer impact storytelling<br><br>3.2 Product compliance, labelling and disclosures for legislation<br><br>3.3 Reporting and analytics |

**FIGURE 5: PHASES OF TRACEABILITY IMPLEMENTATION (FASHION FOR GOOD GUIDANCE).**

# PHASE 1: DEFINING TRACEABILITY STRATEGY

However, having a clearly defined strategy is key **before** implementing digital (or physical) traceability solutions. A clear traceability strategy that incorporates the company wide sustainability strategies is essential to choosing the right tracing solution as well as shaping the implementation thereof.

### KEY ACTION 1.1: DEFINE TRACEABILITY OBJECTIVES

Included in this conceptualisation of strategy should be a focus on **where** in the supply chain to concentrate, and improve data integrity of ESG information. For example, to build Tier 2 and Tier 3 facility profiling, a wider "garment-backwards" approach (See FIGURE 10) may be more suitable. A capability many solutions have, but few have fashion specific experience with (e.g. Trustrace, Supply Shift, Papertale, Infinichains, Altana, and more recently Textile Genesis, and Fibretrace with mapping backwards capabilities).

### KEY ACTION 1.2: CHOOSE VERIFICATION PILLARS OF FOCUS

Verification pillars (based on Textile Exchange's definition of the three levels of verification) are central in any traceability strategy to strengthen chain of custody management of incoming inventory. For the first step of **digital traceability**, transactional verification (provided by verifying transactional certificates of incoming orders) and site verification (given by verifying scope certificates of incoming orders) should be strived for.

### KEY ACTION 1.3: ASSESS RELEVANT TECHNOLOGY TO MEET YOUR OBJECTIVES

And this brings us to this report. See below (FIGURE 6) for the last Key Action of Phase 1, assessing which solution is needed to meet traceability use cases and objectives. Understanding the landscape, focus areas, and trends of these solutions can aid the conversation of defining strategy and help create a clearer picture of what can be achieved. See Phase 2: Integration (See FIGURE 5) showing the focus areas and processes of digital traceability when implemented.

### OTHER CONSIDERATIONS

Four additional points to consider for a brand, when matching motivations with SCTP capabilities:

- First, run an internal diagnostic of the company's supply chain needs and traceability use cases.
- Depending on company size and sustainability focus, decide which to prioritise: a "garment-backwards" or a "fibre-forwards" approach.
- Study incoming legislation and build a company data protocol to report on ESG data correctly and efficiently to relevant governmental organisations (this can also be applied to other sustainability reporting protocols e.g. SBTi, GHG protocol).
- Join ecosystem partners in collaborative traceability initiatives for knowledge sharing.

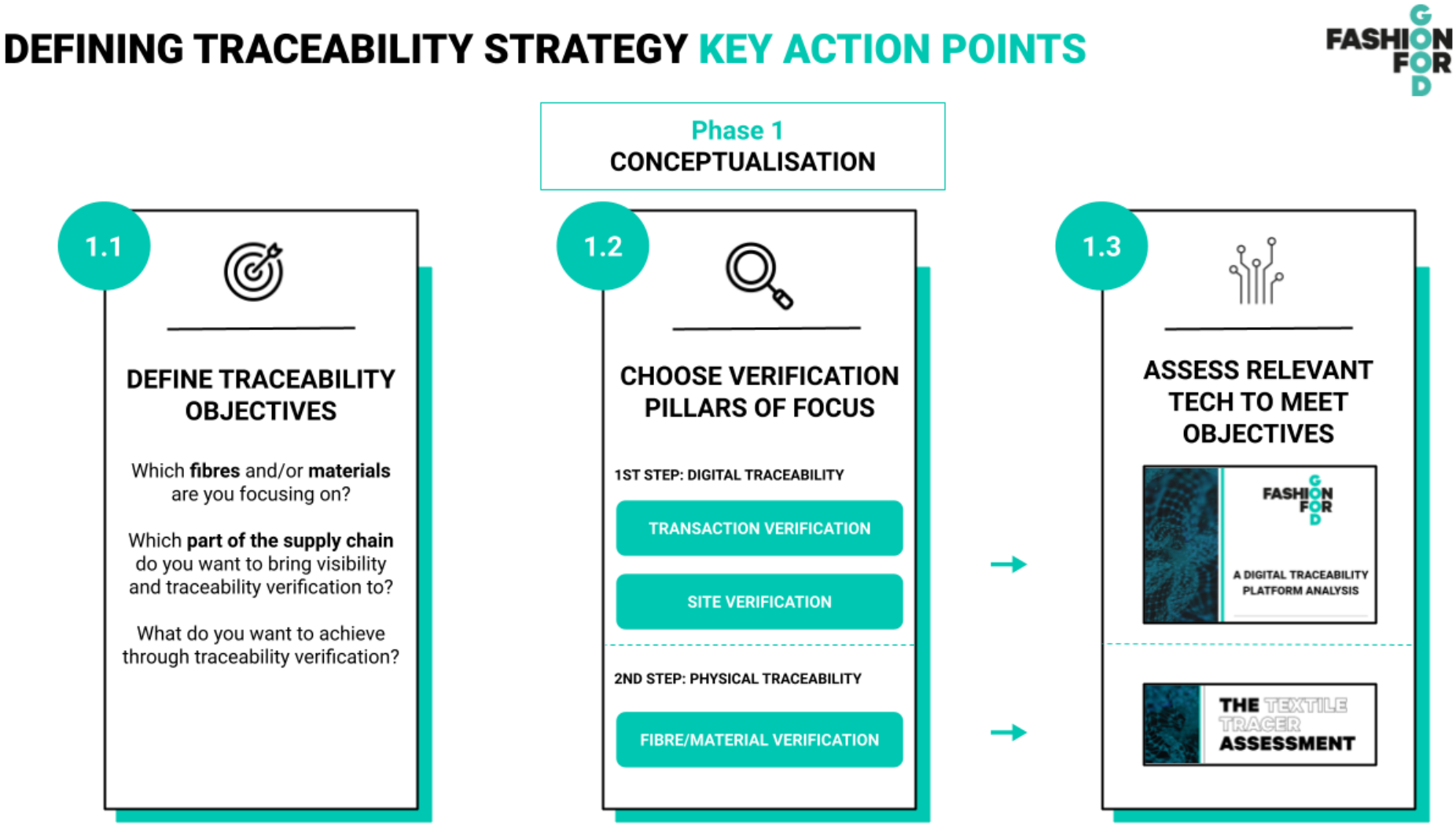



**FIGURE 6:** PHASE 1 OF TRACEABILITY IMPLEMENTATION: "CONCEPTUALISATION" AND KEY ACTION POINTS.

# TRACEABILITY VERIFICATION PILLARS

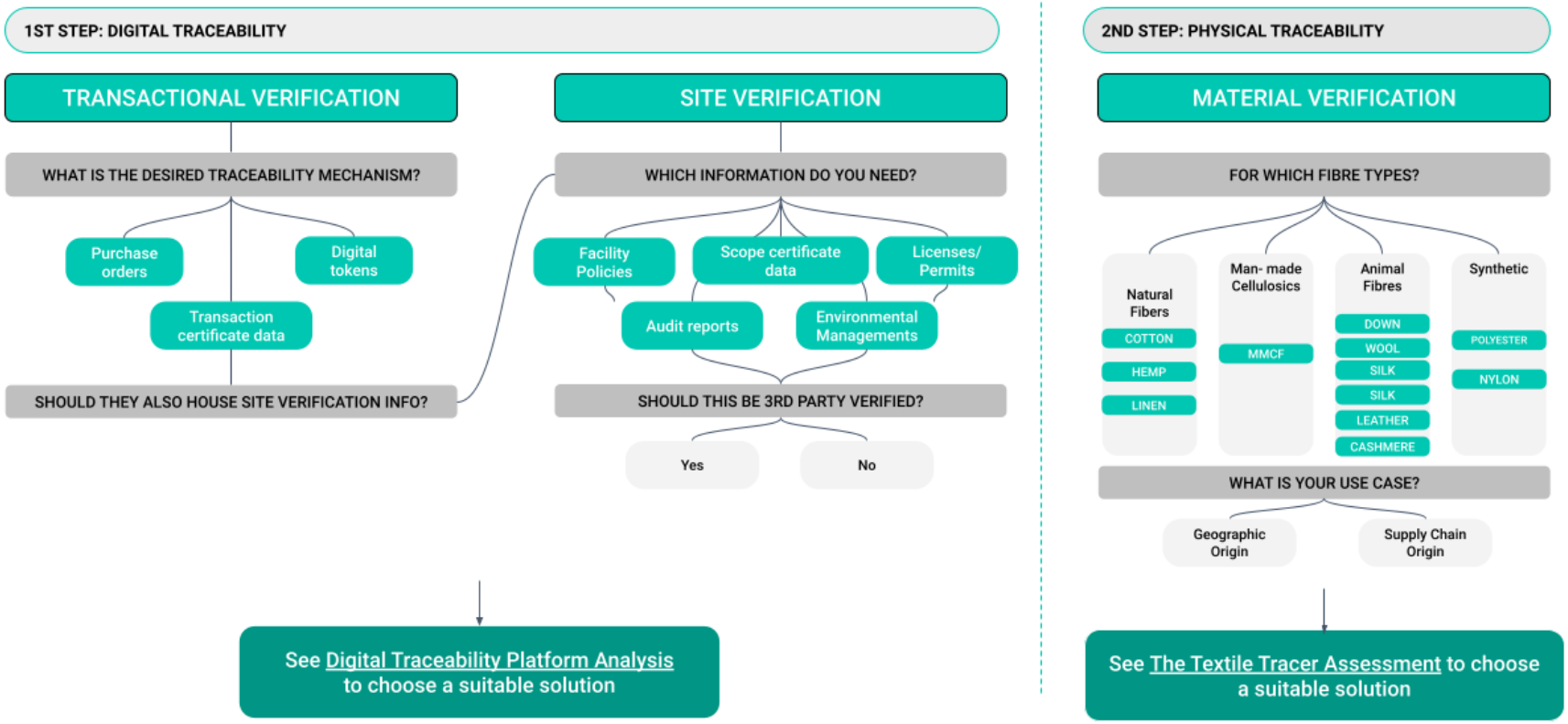



**FIGURE 7: THE THREE TRACEABILITY VERIFICATION PILLARS: TRANSACTIONAL, SITE, AND FIBRE/MATERIAL VERIFICATION**

# WHAT ARE SUPPLY CHAIN TRACEABILITY PLATFORMS?

Supply Chain Traceability Platforms (SCTPs) are cloud-based or blockchain solutions that provide digital supply chain mapping and visualisation tools, and perform material, batch, and product traceability, facility profiling, and risk analysis. They are used to consolidate and verify chain of custody documentation (e.g. transaction certificates, scope certificates, purchase orders, bill of lading), and allow Application Programming Interface (API) integration with brand's PLM systems, supplier's ERP systems, and interoperability with other supply chain databases (e.g. Open Supply Hub[24]). The majority of supply chain traceability platforms provide the user with an interactive dashboard, allowing visualisation tools to map supply chain flows globally.
The supply chain scope for these solutions are: Scope three / Cradle to gate / Tier four to tier one.

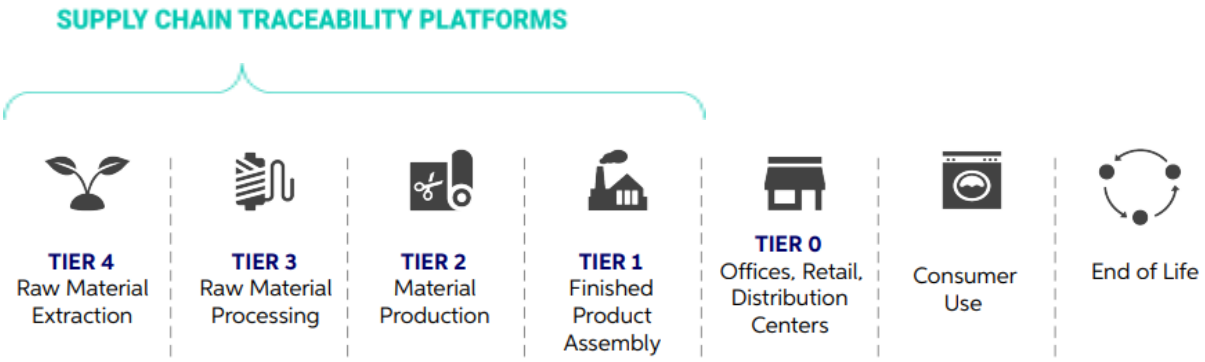



**FIGURE 8: SUPPLY CHAIN SCOPE OF SUPPLY CHAIN TRACEABILITY PLATFORMS**

## SCTPS BENCHMARKED IN THIS REPORT

Below shows all Supply Chain Traceability Platforms[25] benchmarked in this report (see FIGURE 9), alongside a subjective Fashion Readiness assessment score out of 5, rated using the following 3 criteria. This score provides a high level indication of the solutions readiness for application and performance in the fashion industry.

**FASHION READINESS CRITERIA:**

**1. Supplier, brand, and retailer engagement has already occurred**

- Ecosystem collaborations (e.g. with standard certifications)
- Implementations[26]

**2. Advancement of the offering(s), based on:**

- Tracking Approaches
- Transaction Verification Supported
- Site Verification Supported
- Chain of Custody Model Supported
- Business Rules
- Traceability solution implementation guidance

[24] https://www.opensupplyhub.org/
[25] These platforms were scouted via desktop research and/or already established relationships with Fashion for Good.
[26] Referring to integration of the SCTP internally within a brand's operations. e.g Adidas (Brand) and Trustrace (SCTP) link here.

| SUPPLY CHAIN TRACEABILITY PLATFORMS (SCTPs) | FASHION READINESS (out of 5) |
|---|---|
| Altana.Ai | 3 |
| Avery Dennison | 5 |
| Bext360 | 4 |
| ChainPoint | 5 |
| Circularise | 4 |
| Everledger | 4 |
| EVRYTHNG | 5 |
| Fibretrace | 5 |
| Green Aureus | 3 |
| Infinichains | 5 |
| Kryha | 3 |
| Logility | 4 |
| Minespider | 3 |
| PaperTale | 5 |
| Retraced | 5 |
| Suku | 4 |
| SupplyShift | 5 |
| tex.tracer | 4 |
| Textile Genesis | 5 |
| The ID Factory | 5 |
| Thriiive | 2 |
| Tracified | 5 |
| Transparency One | 4 |
| TrusTrace | 5 |
| VeChain | 5 |
| Viji | 4 |

**FIGURE 9:** Supply Chain Traceability Platforms (SCTPs) categorised and benchmarked in this report

# 1.2: CAPABILITIES

## *WHEN AND WHY TO USE CERTAIN SUPPLY CHAIN TRACEABILITY PLATFORMS?*

This section analyses the claimed capabilities and performance of SCTPs, based on interviews and spreadsheet questionnaires sent out by Fashion for Good to the service providers. Fashion for Good also took a look at fibre use cases (see FIGURE 11), which maps previous engagement (August 2022 and prior) tracing certain fibre types in the fashion industry.

The definition of each capability benchmarked is included in the definition list below with the analysis following.

## DEFINITION LIST OF CAPABILITIES

| TOPIC | TERM | DEFINITION |
|---|---|---|
| EXPERIENCE IN THE FASHION INDUSTRY | **Fashion Readiness** | "Fashion readiness" indicates (from a Fashion for Good perspective) how prepared the service provider is to implement its solution with brands and supply chain partners in the fashion industry. |
| TRACKING APPROACHES | **Fibre-Forwards** | A fibre-forwards approach refers to supply chain traceability platforms capturing transactions and shipments in real-time, and in parallel to the product journey along the supply chain. This creates digital inventory of materials verifying geographic and supply chain origins and creating weight-based material accounting to avoid double counting of certified materials, and allowing for wastage factor model analytics. |
| | **Garment-Backwards** | A garment-backwards approach refers to creating visibility of the supply chain from a brand's operations, usually mapping the supply chain by using the Purchase Orders (POs) as scope and reference.. This approach relies on self-declarations made by facilities about their suppliers and uses historical data which can be difficult to verify. |
| TRANSACTION VERIFICATION SUPPORTED | **Digital Tokens / Digitising textile assets (fibre, yarn, fabric, product)** | A digital recording of the fibre/material/product and associated data (facility, geo-tagging, certificates) |
| | **Transactional Certificates** | Also known as TCs: an official document that verifies that the products and quantity exchanged along the value chain is within the certified scope of each site and reconciles to inventory[27]. |
| | **Purchase Orders** | Also known as PO's: usually a series of digits issued by a buyer committing to pay the seller for the sale of specific products or services to be delivered in the future[28] |
| SITE VERIFICATION SUPPORTED | **Scope Certificates** | Also known as SCs: an official document that verifies that the processes carried out at site conform to operational and/or sustainability criteria defined by the standard. |

[27] https://textileexchange.org/tetrackit/
[28] Purchase Orders definitions

| | | |
|---|---|---|
| | **Second Party Information** | Self declared information from facilities themselves, this can include, but not limited:<br>• Facility Policies<br>• Organisational licences<br>• Permits |
| | **Third Party Information** | Information supported and verified by third party certification bodies (CBs) (e.g. Control Union). This can include, but not limited:<br>• Certification scope certificates<br>• Auditing reports |
| **CHAIN OF CUSTODY MODEL SUPPORTED** | **Article-level** | Refers to the scope of reference at SKU product level |
| | **Lot-level** | This refers to the scope and granularity of digital tracking at batch level (referring to the accumulation of cotton bales into "batches" at Tier 4 ginning stage). And can relate to both garment-backwards and fibre-forwards approaches. |
| | **Identity Preservation** | This approach provides traceability back to a single point of origin, from a farm or group of farms to the gin or final users. Each lot, batch, quantity or consignment of certified product is treated separately. It is physically separated from other certified or non-certified products throughout the supply chain, as is its associated documentation. This model does not allow mixing of non-certified materials anywhere in the supply chain[29]. |
| | **Segregation** | In bulk segregation, certified products are kept physically separate from non-certified products through each stage of the supply chain. The mixing of certified materials from different producers is permitted, but documentation denoting the region or country of origin is often kept. All producers must comply with the certification standards. |
| | **Mass Balance** | In the Mass Balance model, products from both certified sustainable and non-sustainable sources are mixed. As they move through the supply chain, an exact account of volume ratios is kept. In this way, the volume of certified product entering the operation is controlled and an equivalent volume of product leaving the operations (minus about 20% wastage through processing) can be sold as certified. |
| **BUSINESS RULES** | **Composition Validation/Volume Reconciliation** | Having the capability of composition validation, validating that output matches input between manufacturing steps (in terms of fibre/yarn/fabric weight). An example is a supplier having digital inventory that matches their physical inventory. This means that they can only produce x amount of output if it matches x amount of input. Therefore allowing validation of input/output product combinations between suppliers across the supply chain. |
| | **Wastage Factor Modelling** | Automatically calculating the amount of wasted fibre/yarn/material between product combinations and manufacturing processes. |
| **IMPACT TRACKING** | **Impact Tracking** | Ability to calculate environmental and/or social impact of product journeys and associated facilities. Also known as product footprinting, this uses a combination of primary supply chain data, secondary data estimations, and life cycle assessment methodologies in order to bring impact visibility to the operations of a brand and/or supplier. |

[29] http://cottonupguide.org/sourcing-options/understanding-traceability/#1520083011211-d145200f-2679


SUPPLY CHAIN TRACEABILITY PLATFORMS
Fashion Industry Readiness (out of 5)
TRACKING APPROACHES
Fibre forwards
Garment backwards
TRANSACTION VERIFICATION SUPPORTED
Digital tokens
Transactional certificates
Purchase orders
SITE VERIFICATION SUPPORTED
Scope certificates
Second party information
Third party information
CHAIN OF CUSTODY MODEL SUPPORTED
Article-level
Lot-level
Identity preservation
Segregation
Mass balance
BUSINESS RULES
Volume reconciliation
Wastage factor modelling
IMPACT TRACKING
Altana.Ai 3
Avery Dennison 5
Bext360 4
ChainPoint 5
Circularise 4
Everledger 4
EVRYTHNG 5
Fibretrace 5
Green Aureus 3
Infinichains 5
Kryha 3
Logility 4
Minespider 3
PaperTale 5
Retraced 5
Suku 4
SupplyShift 5
tex.tracer 4
Textile Genesis 5
The ID Factory 5
Thriiive 2
Tracified 5
Transparency One 4
TrusTrace 5
VeChain 5
Viji 4

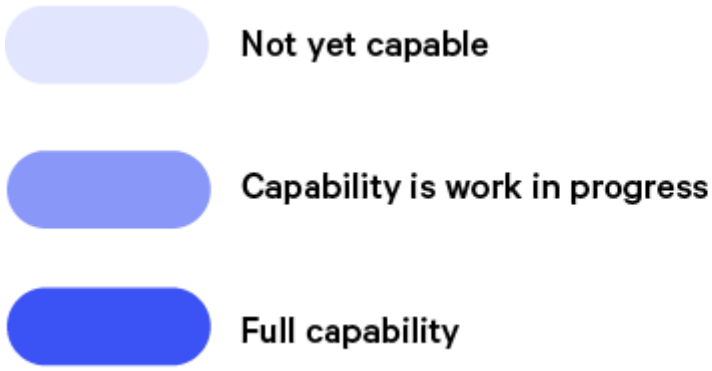



**FIGURE 10: PROVIDES AN OVERVIEW OF THE CLAIMS MADE BY SUPPLY CHAIN TRACEABILITY PLATFORMS ON THEIR TRACING CAPABILITIES IN THE TEXTILE SUPPLY CHAIN.**

# TRACKING APPROACHES

## FIBRE-FORWARDS VS GARMENT-BACKWARDS APPROACHES

For supply chain traceability platforms, a key distinction is between fibre-forwards and garment-backwards tracking approaches. These are the two main approaches when implementing with a user to improve supply chain data integrity and traceability verification.

## FIBRE-FORWARDS

### REAL TIME TRACKING

**Fibre-forwards** (also known as “bottom up”) approaches should be pursued to facilitate real-time tracking of product flows at an item, SKU, and/or batch level. This suits well with brands wanting to verify identity preserved or segregated chain of custody models (see FIGURE 10) for sustainably certified materials, gain accurate weight-based material calculations, and facilitate the flow of information at a more granular level for impact tracking.

SCTPs with fibre-forwards capabilities allow for real-time and secure digital identities to be created in parallel to the commodity flow. This data is uploaded (via interoperability with other systems) and exchanged on blockchain ledgers for immutability, credibility, and operational efficiency (see insert: Blockchain use cases for supply chain traceability a few pages down). This supports tracking and matching the physical flow of materials with secured digital records throughout the supply chain.

### EFFICIENT TRACEABILITY

The fibre-forwards approach is well suited if supplier engagement has already occurred for desired product journeys, or if the SCTP offers engagement with already onboarded suppliers to their software platform.The main advantage of fibre-forwards traceability approaches is that it obtains product flow data in real-time, rather than garment-backwards approaches that rely on data requests sent to suppliers.

Fibre-forwards approaches support identity-preserved and/or segregated chain of custody models well for certified fibres and materials, based on more granular digital inventory tracking of physical goods. In addition, a fibre-forwards approach can help to reduce life cycle data management of verifying product certificates significantly for the user.

### ANALYSIS

Just over half of the solutions benchmarked offered fibre-forwards tracking. This capability correlates positively with wastage factor modelling and composition validation (and therefore volume reconciliation). These weight-based material calculation capabilities are assisted greatly by a fibre-forwards approach.

The recommendation would be to ensure that the use case to implement real-time tracking processes is strong, and that there is motivation to improve the integrity, and reduce the verification burden of product certificates (e.g. overcome by data interoperability automated processes between SCTPs and third party certification bodies) and data certification management and communication in general. Then if proven, engage with a fashion experienced solution with fibre-forwards capability.

## GARMENT-BACKWARDS

**PRACTISED AT THE BEGINNING OF TRACEABILITY IMPLEMENTATION**

**Garment-backwards** (also known as "top down" or "cascading tracing") mapping approaches should be practised at the start of the supply chain mapping journey, an essential direction for larger brands with minimal visibility of their facilities beyond Tier 1 and who wish to build facility profiling and audit assessment databases.

Garment-backwards approaches follow a more traditional approach, mapping the supply chain from the finished garment-backwards. Using a brand's purchase orders (POs) as the data point of scope and reference to begin mapping origin back, and build a detailed mapping of supply chain inventory and facility information.

**AN ACCESSIBLE APPROACH TO BRANDS WITH LIMITED SUPPLY CHAIN VISIBILITY**

The garment-backwards should be practised at the start of the supply chain mapping journey, and suits well for larger brands with minimal visibility of their facilities beyond Tier 1. And for brands who wish to further access facility profiling and audit assessment databases of their suppliers, for reasons of additional transparency rather than narrower motivations for product traceability (e.g. mapping and verifying facility audit reports, environmental licences, and other worker and facility related data[30]).

**A COMMON CAPABILITY FOR MOST SCTPs**

All but 3 SCTPs claimed garment-backwards mapping capability (see FIGURE 10). This is a central capability for all SCTPs looking for applicability in the fashion industry. The majority of SCTP claimed capability of mapping both directions, garment-backwards **and** fibre-forwards. A key trend looking forward is implementing both approaches simultaneously: Working garment-backwards with supply chain mapping and facility profiling, whilst tracking forwards from higher points in the supply chain to trace preferred/certified fibres and materials in real-time.

# KEY TAKEAWAYS:

## FIBRE-FORWARDS APPROACH

**WHEN TO USE:**

- Product traceability data in real-time
- Used to facilitate real-time tracking of product flows at an item, SKU, and/or batch level.

**MAIN ADVANTAGES:**

- Suits well with brands wanting to verify identity preserved or segregated chain of custody models for certified fibres and materials.
- Allows for weight-based material calculations for more granular impact tracking.

**MAIN CHALLENGE:**

- Supplier engagement needed prior to implementation.

[30] For further interest in data transparency at facility level please see the Open Supply Hub: an accessible, collaborative, supply chain mapping platform, used and populated by stakeholders across sectors and supply chains.

## GARMENT-BACKWARD APPROACH

**WHEN TO USE:**

- At the start of the supply chain mapping journey, building supplier visibility from the PO backwards.
- Essential direction for larger brands with minimal visibility of their facilities beyond Tier 1 and who wish to build facility profiling and audit assessment databases.

**MAIN ADVANTAGES:**

- Quick starting point for a brand's traceability implementation journey. Easy to initiate (based on the data integrity of your POs, which most brands have good access to).
- Capability to build further visibility beyond Tier 1 (the suppliers of your supplier) without the need for direct engagement by the user.

**MAIN CHALLENGE:**

- Relies on data requests sent to suppliers to retrieve facility information.
- Data requested can be received by the brands months behind the physically received purchase orders.

---

## WHICH APPROACH TO CHOOSE?

- Fibre-forwards for real time traceability verification of preferred fibres for product certification and sustainable capsule collections.

- Garment-backwards to create visibility of your supplier landscape and facility data points, using PO data points to map inventory backwards.

- Important to note that both tracking approaches can be implemented in tandem, and many SCTPs offer both capabilities (see FIGURE 10**).** For example, you may use a garment-backwards approach to build higher supply chain visibility (e.g. Tier 2, 3, and 4), whilst simultaneously using a fibre-forwards approach to bring real-time digital tracking to specific parts of your supply chain (e.g. preferred fibres for sustainable product capsules and collections).

---

## FIBRE-FORWARDS: WILL IT BECOME THE NORM?

Not yet. Creating supplier engagement through garment-backwards approaches is key for larger brands with limited supply chain visibility, and a key prerequisite before implementing fibre-forwards tracking with suppliers. However as suppliers become more engaged in traceability initiatives, and blockchain technology becomes more widespread in the textile supply chain, fibre-forwards tracking will become a central traceability feature for all providers. Incentivised by the operational agility it can facilitate: live visibility of product flow, trustworthiness for corporate disclosures, and accurate mathematical calculations between facilities (or "blocks" on the chain) for wastestream analytics, volume reconciliation, smart contracts, and inventory management.

# BLOCKCHAIN

**USE CASES FOR BLOCKCHAIN LEDGERS IN SUPPLY CHAIN TRACEABILITY**

---

**DISCLOSURE INTEGRITY:**

*More trustworthy data disclosure and legal audibility for third party certification bodies and governments via open source, distributed, blockchain platforms.*

---

**FIBRE-FORWARDS:**

*Real-time tracking: key for helping meet incoming EU PEF legislation[31] for environmental disclosure at product/SKU level. Reducing data life cycle management burden for verifying product certification.*

---

**OPERATIONAL EXCELLENCE:**

*Supply chain data consolidation on a blockchain platform can lead to faster visibility of siloed nodes for more impactful and instant inventory capacity management. Allowing for more accurate data calculations between suppliers and product combinations (volume reconciliation, waste stream models, smart contracts).*

---

**NFT DATA SECURITY FOR PRODUCT PASSPORTS:**

*A fast growing use case in the circularity space is to upload and protect product information and legitimate identity to a brand, protecting a brands image from counterfeiting of goods.*

---

[31] https://apparelcoalition.org/about-pef/

# TRANSACTION AND SITE VERIFICATION SUPPORTED

Transaction verification is proven via transaction certificates, and verifies that the products and quantity exchanged along the supply chain is within the certified scope of each site and reconciles to inventory. SCTPs support this verification pillar (See FIGURE 10) via housing these transaction certificates, and verifying against inventory and supplier output capacity.

Use of digital 'twin', digital token, or “e” token are different terms, but for easier comprehension they serve similar functionality and use cases. Via digital tokenisation on blockchain ledgers that mirror the physical flow of goods, textile assets (fibre, material, products) are digitised across manufacturing steps. Useful to avoid double counting of inventory, and matching and securing digital records against physical assets on the supply chain floor.

Site verification is proven via scope certificates, audit reports, and other licences and permits at facility level. Scope certificates communicate adherence to a sustainability standard (e.g. BCI, GOTS, Textile Exchange’s standards). These are exchanged with transaction certificates from suppliers to buyers, verifying that the processes carried out at the facility level conforms to the operational and/or sustainability criteria defined by the sustainability standard.

In addition, SCTP can have the capability to house second-party information and third party information:

### SECOND-PARTY INFORMATION:

Self declared ESG credentials from facilities themselves, this can include, but not limited to:

- Facility policies
- Organisational licences
- Environmental permits

### THIRD-PARTY INFORMATION:

This refers to verification mechanisms for ESG data points by third party certification bodies (e.g. Control Union, ECOCERT, SGS).
This can include, but not limited to:

- Scope certificates for fibre, material, and product certification (e.g. GOTs, BCI, Textile Exchange standards)
- Social auditing reports for facility certification (e.g. SA8000® social certification standard)

**WHY**

Transaction and site verification are central pillars within a traceability strategy, and relate directly to chain of custody requirements of sustainability standards. Credible traceability requires the interplay of verification at site, transaction, and physical material levels. What is traced, how it is traced, and the assurance levels very much depend on the chain of custody and requirements of the standard in question.

**ANALYSIS**

FIGURE 10 indicates a key aspect that most, if not all service providers have; the ability to consolidate and house all transaction and scope certificates associated with incoming orders. This is done through data portability and interoperability with ERP, VMS, and PLM software systems. It should be noted that scope certificates are exchanged in tandem with transactional certificates for product orders, and therefore we can see this capability mirrored for SCTPs. In addition, the majority of SCTPs have the ability to house both second-party and third-party information ESG credentials from suppliers.

However, Some go further to provide automated verification mechanisms to validate sustainability standards with certification bodies (Textile Genesis, Papertale). This refers to having direct interoperability with certification

bodies, to reduce the lead time of certification data life cycle verification, and to prevent fraud and duplication of transaction and scope certificates via peer-to-peer validation. For further elaboration see FIGURE 15 (interaction with sustainability standards).

# SUPPORTED CHAIN OF CUSTODY MODELS

Service providers were asked by Fashion for Good to give their capabilities to support the following Chain of custody models:

- **ARTICLE-LEVEL**
- **LOT-LEVEL**
- **IDENTITY PRESERVATION**
- **SEGREGATION**
- **MASS BALANCE**

**WHAT/HOW**
A key distinction here is how chain of custody **models** differ from chain of custody **requirements.**

Chain of custody models refer to the method in which fibres, materials, and products are traced in the supply chain, focusing on the physical flow of commodities (see FIGURE 10, 11, 12 as examples for examples).

Chain of custody requirements (also referred to as standards), go beyond just the tracing method and physical flow to additionally outline how the data is disclosed and verified to meet the criteria of a sustainability standard (e.g. Textile Exchange's Content Claim Standard for its certifications).

**WHY**
When choosing a SCTP, it's important to understand the history of tracing these different chain of custody models. This will help align chain of custody requirements of sustainability standards with SCTPs tracing experience of chain of custody models required to meet the requirements of a standard. Below we dive into chain of custody models, and their differences, and how they apply to SCTPs.

### ARTICLE-LEVEL[32]
Granular tracking at article or SKU level. And can relate to both garment-backwards and fibre-forwards approaches.

### LOT-LEVEL[33]
The scope and granularity of tracking referring to the accumulation of cotton bales into "batches" at Tier 4 ginning stage). And can relate to both garment-backwards and fibre-forwards approaches.

### IDENTITY PRESERVATION
Provides traceability back to a single point of origin, from a farm or group of farms to the gin or final users. Each lot, batch, quantity or consignment of certified product is treated separately. It is physically separated from other certified or non-certified products throughout the supply chain, as is its associated documentation.This model does not allow mixing of non-certified materials anywhere in the supply chain.[34]

[32] Not an official chain of custody model supported by sustainability standards, but similarly refers to granularity of tracking capability and scope
[33] Not an official chain of custody model supported by sustainability standards, but similarly refers to granularity of tracking capability and scope
[34] Cotton Up Guide

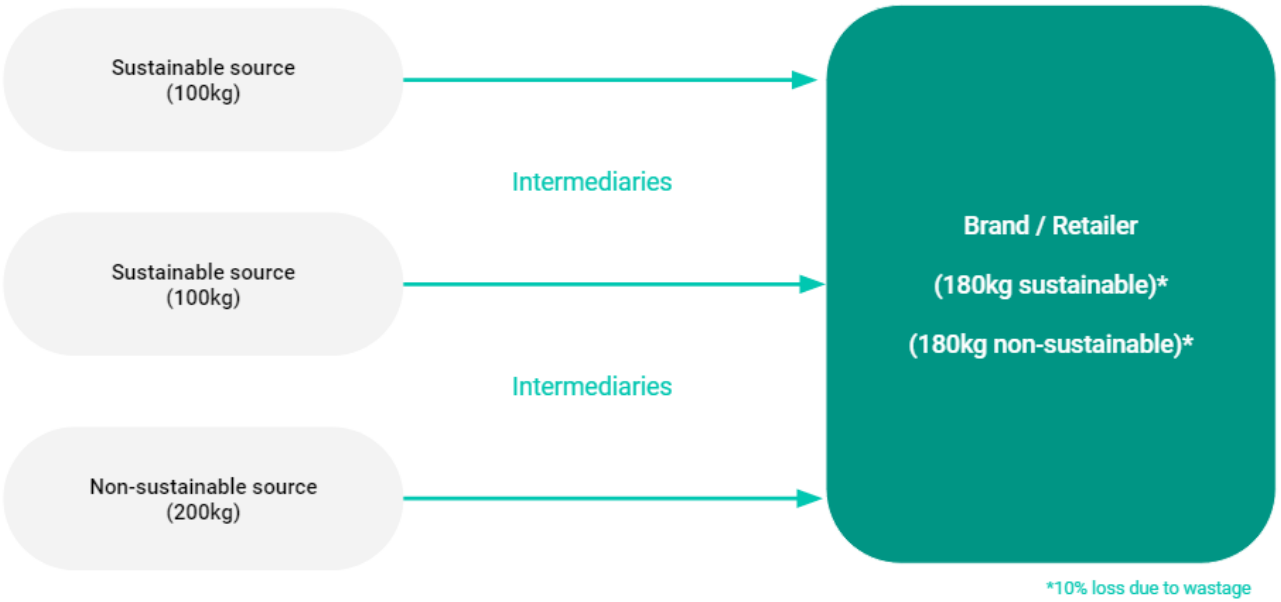



**FIGURE 11: SUPPLY CHAIN SCENARIO FOR AN IDENTITY PRESERVED CHAIN OF CUSTODY MODEL**

## SEGREGATED

In a segregated model, certified products are kept physically separate from non-certified products through each stage of the supply chain. The mixing of certified materials from different producers is permitted, but documentation denoting the region or country of origin is often kept. All producers must comply with the certification standards.[35]

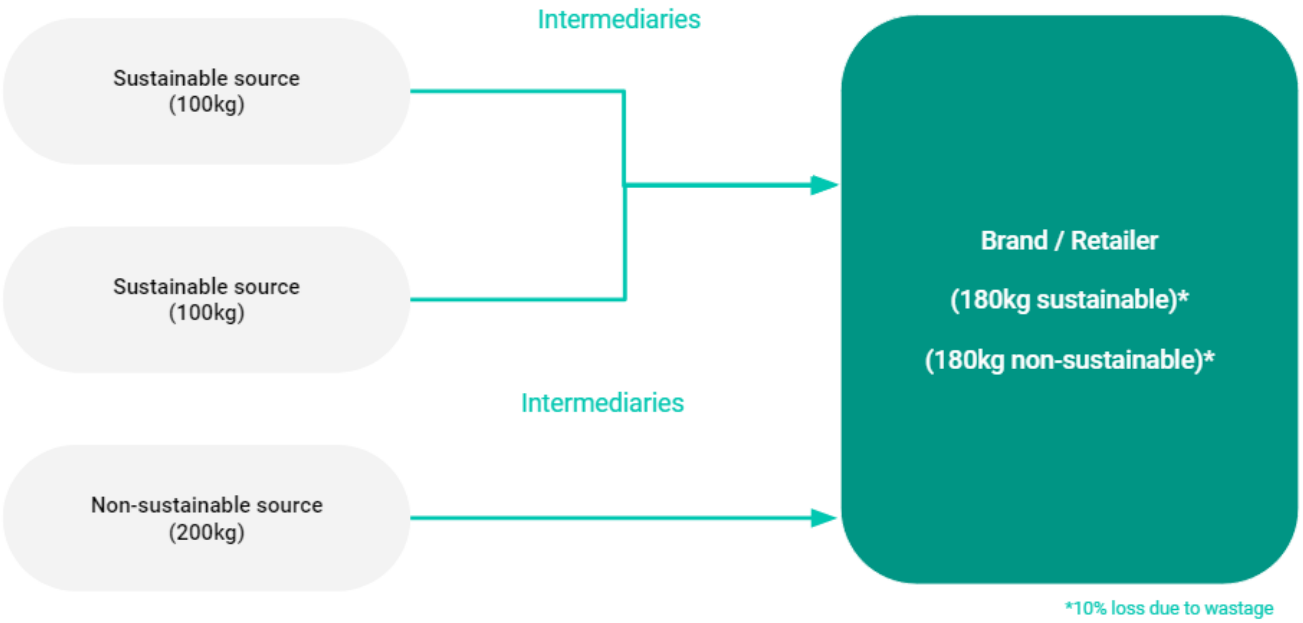



**FIGURE 12: SUPPLY CHAIN SCENARIO FOR A SEGREGATED CHAIN OF CUSTODY MODEL**

[35] Cotton Up Guide

## MASS BALANCE

For a mass balanced products from both certified sustainable and non-sustainable sources are mixed. As they move through the supply chain, an exact account of volume ratios is kept. In this way, the volume of certified product entering the operation is controlled and an equivalent volume of product leaving the operations (minus about 20% wastage through processing) can be sold as certified.[36]

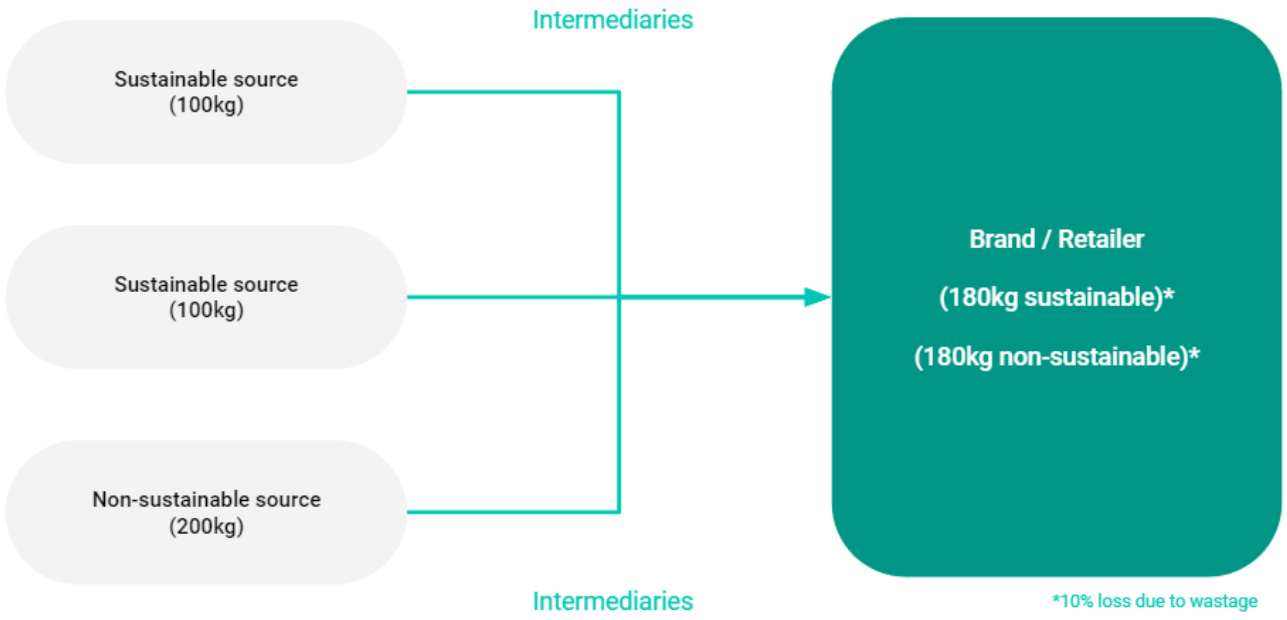



**FIGURE 13: SUPPLY CHAIN SCENARIO FOR A SEGREGATED CHAIN OF CUSTODY MODEL ANALYSIS**

For the supported chain of custody models, FIGURE 10 shows that claimed capabilities from SCTPs differed greatly. This is based on past experiences working with brands, and therefore chain of custody models required for the fibres and materials in their scope of interest.

A key takeaway is that 9 SCTPs lack the capability to support a Mass Balanced chain of custody model. Industry wide, there is a shift of focus from Mass Balanced models to segregated and identity preserved models (paralleled with motivations for more granular product-level traceability together with fibre-forwards approaches, alongside human rights concerns with sustainability standards based on a Mass Balanced approach).

Depending on the fibres and chain of custody models in scope for a brand's operations, a combination of FIGURE 10 (Capabilities) and FIGURE 11 (Fibre Use Cases) will indicate fibre types and chain of custody models supported by SCTPs. This gives visibility to sustainability standards that can be covered effectively

e.g.
Mass balance capability and cotton fibre experience = Better Cotton Initiative certification.
Segregated capability plus wool experience = Responsible Wool Standard

That said, a majority of SCTPs can mould their tracing capabilities around the need of the user, implementing digital traceability and transactional/scope verification mechanisms to meet required chain of custody models of certain sustainability standards.

[36] Cotton Up Guide

# BUSINESS RULES

## *VOLUME RECONCILIATION AND WASTAGE FACTOR MODELLING*

## VOLUME RECONCILIATION

### VERIFYING THE OUTPUT AND INPUT OF INVENTORY

**Volume reconciliation** is having the capability of flagging if the output of a product sold from a facility breaches its production capacity. This involves material weight validation: validating that the output of a product (e.g. yarn) matches the input of a product (e.g. fabric roll) at the next manufacturing steps and between product combinations. One example is suppliers having digital inventory that matches their physical inventory. This means that they can only produce X amount of output if it matches X amount of input. Therefore allowing validation of input/output product combinations between suppliers and manufacturers across the supply chain.

### AVOIDING FALSELY CERTIFIED SUPPLY

It is a key capability for brands, suppliers, and sustainability standards who wish to avoid fraud and falsely certified fibre, material, and products. Suppliers outputting and selling more product than their capacity allows is made visible by fibre-forwards tracking approaches. Enabled by the creation of digital inventories and weight-based calculations (e.g. creating a digital twin or token for every kilogram of sustainable material produced at point of origin, and mathematically relaying that to product combinations between supply chain tiers to confirm traceability integrity). This allows the user to flag false certification of materials in real-time, prior to products reaching the distribution warehouses or the store.

### MOST SCTPs BENCHMARKED HAVE THE CAPABILITY

FIGURE 10, over half of SCTPs benchmarked have the capabilities for volume reconciliation. An essential capability in order to verify the output of certified sustainable materials from a facility, and one that has been keenly scouted by Textile Exchange to onboard Textile Genesis for their eTrackit traceability programme.[37]

## WASTAGE FACTOR MODELLING

### AUTOMATED CALCULATION OF TEXTILE WASTE

**Wastage factor modelling** is having the capability to automatically calculate the amount of wasted fibre/yarn/material between manufacturing processes and product combinations. Similar to volume reconciliation, this capability is supported by material weight calculations between product combinations, giving visibility to the amount of waste made through and between the manufacturing processes.

### HELPING GUIDE INTERVENTION TO REDUCE IMPACT

This capability provides the bedrock of information to build more circular and sustainable processes at facility level via digital visibility of the amount of fibre and material wasted. This is key for industry players looking to track impact of materials sourced, and to hotspot inefficient manufacturing processes in the supply chain to guide where best to intervene to drive efficiency and impact reductions.

### MOST SCTPs HAVE, AND MANY TRYING TO GET

A majority of SCTPs that have volume reconciliation capability, also have the capability of wastage factor modelling. As focus increases on supply chain efficiency from both a financial and sustainability point of view, five SCTPs indicated that they were working on this capability to offer to users in the future.

[37] https://textileexchange.org/etrackit/

# FIBRE USE CASES

**PREVIOUS EXPERIENCE TRACING FIBRE TYPES**

Here we are looking at experience and previous engagement of SCTP working with different fibre types in the fashion industry. Important to note that these are claimed capabilities by the SCTPs, evidence was not scrutinised by Fashion for Good. Furthermore in critique, the fibre type categories are quite ambiguous, and do not distinguish between certified (preferred) and conventional fibres, and mixes/blends.

This analysis holds importance as it gives insight into the claimed expertise of the SCTPs for tracking certain fibres. Also indicating stakeholder engagement and implementation experience with fibres already tracked. Below is an analysis of the key takeaways from FIGURE 14.


SUPPLY CHAIN TRACEABILITY PLATFORMS
Conventional Cotton
Organic Cotton
Hemp/Linen
Down
Wool
Silk
Leather
Cashmere
Mohair
MMCF
Polyester
rPET
Nylon
Altana.Ai
Avery Dennison
Bext360
ChainPoint
Everledger
EVRYTHNG
Fibretrace
Green Aureus
Infinichains
Kryha
Logility
Minespider
PaperTale
Retraced
Suku
SupplyShift
Textile Genesis
The ID Factory
Thriiive
Tracified
Transparency One
TrusTrace
VeChain
Viji

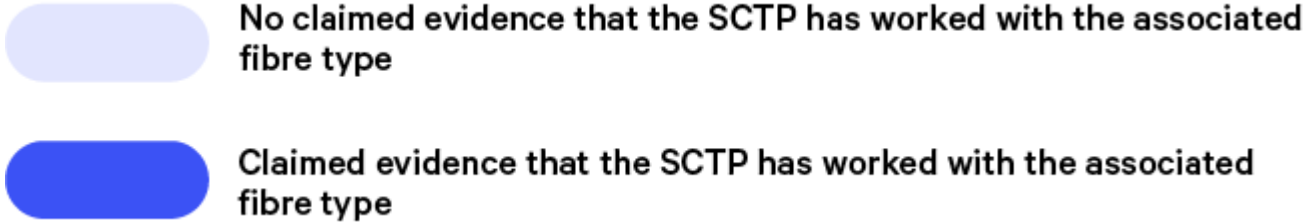



**FIGURE 14: PROVIDES AN OVERVIEW OF THE CLAIMS MADE BY SUPPLY CHAIN TRACEABILITY PLATFORMS ON THEIR CAPABILITIES OF TRACING DIFFERENT FIBRE TYPES IN THE TEXTILE SUPPLY CHAIN.**

**COVERING ALL FIBRES**

Five brands **claimed** complete competence in having experience tracing all natural, animal, and synthetic fibres.

- TrusTrace
- Textile Genesis (Preferred/certified fibres only)
- Avery Dennison's Atma.io
- Supply Shift
- Viji

This shows great fibre coverage, however it does not indicate supply chain reach in terms of Tiers covered E.g. Viji's more consumer-facing application communication doesn't have the same upper stream supply chain reach as the other top four performing service providers.

This indicates that for larger brands, these top four have great potential to cover large fibre and supply chain scopes for a high number of different product journeys within your supply chain landscape.

**COTTON PROFICIENCY**

Capability to trace cotton dominates in a mixed bag of claimed fibre capabilities by service providers. Garment-backwards mapping approaches were initiated by the industry business relevance for cotton traceability. For larger brands, it remains the best way to start the traceability journey if the primary motivation is to map cotton sourced abroad.

**SILK, MOHAIR, AND MMCF LESS TRACED**

Silk, Mohair, and man-made cellulosic fibres (MMCF) have been traced less by the service providers. This was reported by some due to less demand by brands to prove geographic and supply chain provenance for these fibre types. For MMCF it is considered this will change quickly due to motivations to sustain biodiversity through mitigating deforestation, and the huge growth potential for recycled MMCFs for circularity purposes.

**LEATHER AND WOOL**

Traceability competency for these two fibre types is seen in high demand, as shown by previous work tracing leather and wool by the SCTPs. Understanding which SCTPs have this experiences is important if you are considering bringing further traceability integrity to such certifications as the Responsible Wool Standard (RWS), and other leather traceability standards (e.g. leather working group[38]).

**SYNTHETICS**

With large interest and investment in the growth of rPET by manufacturers and brands alike, alongside an easier digitisation process in rPET facilities over their natural fibre counterparts, the verification of rPET integrity is well covered by SCTPs.

Generally speaking, most service providers can mould capability strength around objectives of the user, with "fashion readiness" a key indicator to differentiate generalists from fashion focused SCTPs.

[38] https://www.leatherworkinggroup.com/certification/

# 1.3: INTEROPERABILITY

## *WHICH OTHER SUPPLY CHAIN SYSTEMS CAN SCTPs WORK WITH?*

This section analyses if and how traceability platforms interact with:

- Other supply chain software platforms
- Tracer technologies (focused on physical verification)
- Sustainable standards and associated certificates

## INTEROPERABILITY: INTEGRATE OR YOU'LL FALL BEHIND

Financial and ESG data points associated with the flow of goods in the fashion supply chain sit in various different systems across many stakeholders. This has created difficulty for brands and retailers to verify upper-stream data with confidence due to siloed data management, and lack of data exchange and transmission protocols (e.g. GS1) to guide portability and automated data exchanges between software. As a result, a key capability for traceability digital platforms is exactly this interoperability[39], to have the technical capability to connect with other software platforms (e.g. Enterprise Resource Planning (ERP), Product Lifecycle Management (PLM)) efficiently, and for the benefit of the user. Being able to speak to other supply chain systems via data interoperability is a key functionality for SCTPs.

[39] Important to note: This definition of "interoperability" also encompassess "data portability"


**FIGURE 15: PROVIDES AN OVERVIEW OF THE CLAIMS MADE BY SUPPLY CHAIN TRACEABILITY PLATFORMS ON THEIR INTEROPERABILITY POTENTIAL IN THE TEXTILE SUPPLY CHAIN**

**INTEGRATING IMPACT WITH SOURCING DECISIONS**
This is a must have for all SCTPs in order to be relevant for brands. Key future prospects here involve live impact tracking of products as they are designed, created, and shipped from sourcing regions. Allowing designers and supply chain coordinators to see comparatively, the true impact of material and sourcing decisions by integrating more accurate fibre and material impact metrics into sourcing and designer software.

**DISCLOSURE INTEGRITY**
On the legislative side, through the integration of SCTPs with legacy systems (SAP/PLM), providing more accurate disclosures of product information to create product passports[40], support due diligence disclosures, and other environmental law before products reach the store.

**ANALYSIS**
100% of service providers have Application Programming Interface (API) capabilities to sync with legacy brand systems such as SAP, VMS and PLM systems.

# INTERACTION WITH SUSTAINABILITY STANDARDS

As mentioned previously, SCTPs are the allocation engines to assist housing **and** verifying both transaction and scope certificates for sustainability standards. Therefore there are two capabilities relating to this (as seen in FIGURE 15):

- Can be uploaded and housed on platform (Data Portability)
- Automated verification with certification bodies (Data Interoperability)

The second capability is more advanced, it indicates an institutional collaboration made with sustainability standards in order to automate the verification processes of transactional and scope certificates for incoming orders.

**INCREASING THE EFFICIENCY TO VERIFY PRODUCT CERTIFICATION**
Looking ahead, a key criteria for service providers to have, or be looking into having, is these automated mechanisms to verify fibre, material, and product certificates with sustainability standards (e.g. Textile Exchange) and affiliated third party certification bodies (e.g. Control Union, SGS[41]). This reduces the time taken for certificate data life cycle verification. Allowing both brands, suppliers, and third-party auditors (certification bodies) to move away from manual checks to automatically verifying sustainability certifications. A key example of this is Textile Genesis's use of "e" transactions to validate scope and inventory of orders with certification bodies via Textile Exchange's eTrackit platform. Here digital inventory is peer-to-peer evaluated automatically with a certification body, hence reducing the burden of manual certification data life cycle management[42].

**ANALYSIS**
90% of the service providers interviewed have complete capability to house all types of certificates, even if they do not have automated ways to check and verify them yet. A key capability to meet driving motivations already

[40] A future prospect here is the interoperability between SCTPs and Circualirity platforms (Product Passport), transmitting supply chain data to the digital product identities of the finished product for consumer engagement and recycling use cases.
[41] Société Générale de Surveillance (SGS)
[42] https://textileexchange.org/etrackit/

established by brands to find a single truth for scattered and siloed supply chain ESG data. During the interview process, many SCTPs talked about how this was a key strategy for their offerings going forward. A bottleneck mentioned was relying on the technical capabilities of the software systems used by sustainability standards in order to have data interoperability.

# INTERACTION WITH PHYSICAL TRACER TECHNOLOGIES: WHERE DIGITAL MEETS AND PHYSICAL VERIFICATION

"Integrating physical tracer detection and audits" (see FIGURE 15) refers to uploading physical verification data onto a SCTP. It can be done via two ways:

- Stand-alone data uploads (e.g. spot checking your supply chain landscape with Oritain's forensic analysis of fibres and/or materials, and uploading that to a SCTP).
- Automated data uploads (e.g. Haelixa's additive physical tracer being scanned via in-line machinery spinning of fabric manufacturing facility). Here the data uploads of physical verification is automatic via API integration into a SCTP.

Being "tracer agnostic" (see FIGURE 15**)** refers to integrating with tracer technologies that have their own proprietary IT platform (e.g. ADNAS, Fibretrace, Haelixa), allowing physical verification checks on the supply chain floor to integrate and upload successfully with the SCTPs via APIs (e.g. Trustrace, Textile Genesis), and supplementing transaction and scope certificates of orders.

**PHYSICAL VERIFICATION GIVES ADDITIONAL TRACEABILITY CONFIDENCE**

Transactional and scope certificates of sustainability standards and certificates can be digitised and verified for fibres and materials sourced. Physical traceability (and arguably the most difficult to implement) is implemented with physical tracer technologies[43] (forensic and additive) to provide additional physical and material verification of fibres and materials sourced, to supplement transactional and site verification.

With chain of custody confidence issues for sustainability standards and certification in the industry, additional physical verification of fibres and materials is a capability to keep in mind to increase confidence and sustainability integrity of sourced materials.

**CAPABILITY IS WIDESPREAD**

The majority of SCTPs claim they are capable (or are looking into collaborations) with physical tracer technologies to add physical verification alongside site and transactional verification. Claiming they can integrate physical tracer detection and audits, and be "tracer agnostic".

[43] https://reports.fashionforgood.com/wp-content/uploads/2022/07/The-Textile-Tracer-Assessment.pdf

# 1.4 CONCLUSIVE STATEMENTS

**MAKING A DECISION: WHICH SCTP TO CHOOSE?**

There is not one winning tracer solution to meet all needs. Motivation shapes traceability use cases, and use cases match to the right solution. Proposing suitable solutions is highly contextual, and needs an internal diagnostic of supply chain operations for brand, and strategy definitions of how traceability will support wider sustainability objectives.

With many motivations for improving the integrity of supply chain data, an essential step is to match traceability objectives to the capabilities of SCTPs benchmarked in this report (See FIGURE 10, 11, 14.). The combination of defining internal traceability strategy, with the guidance of this report, should lead to talks with the right SCTPs.

For example:
When looking to improve the reliability of sustainable product certifications, based on refined chain of custody requirements of sustainability standards (e.g. GOTs, Textile Exchange), focus on SCTPs with fibre-forwards capability, and already established institutional collaborations with sustainability standards (those with claimed automated verification with certification bodies is a plus).[44]

When at the start of the traceability journey, and wish to bring supplier visibility and engagement into the organisation for improved data integrity of facility ESG credentials and site verification (see FIGURE 10), focus on SCTPs with garment backward capabilities, and who are high on the "Fashion Readiness" indicator. Which would suggest high engagement with suppliers already in the textile supply chain, and therefore, proven experience requesting and verifying ESG data points from facilities.

When looking to hotspot key areas in scope three supply chain for textile waste and management, engage with a SCTP that has full capability of wastage factor modelling, combined with a high "Fashion Readiness" score.

When looking to iron out fraudulent supplier behaviour, in terms of varying output capacity of certified materials, focus on a SCTP platform of composition validation (and therefore volume reconciliation), combined with a high "Fashion Readiness" score.

When the sole focus is on cotton traceability, see FIGURE 11 to determine which SCTPs have proven working experience with cotton (this can be applied to all fibre types).

When looking to supplement certified fibre and material supply with physical traceability, seek a SCTP which is tracer agnostic, having the ability to house physical verification uploads onto their platform, supplement transaction and scope certification for holistic traceability confidence.

**RECAP OF THE SCPT CAPABILITIES**

Stepping back, SCTPs have multiple core focus areas[45]:

- Supply Chain Traceability
- Supply Chain Transparency
- Mapping Risk
- Impact tracking

[44] Important to note, many SCTP are looking into and/or have made more collaborations (and therefore operational interoperability) with sustainability standards and certification bodies.
[45] It is key to understand that focus areas labelled above are non-exhaustive. Meaning SCTP holds multiple other capabilities beyond those main focus points.

Overall in the traceability innovation landscape Fashion for Good has seen an increase in the number of innovators emerging in the Supply Chain Traceability Platform space. This is due to the widespread motivations to digitise supply chain data across industries for supply chain management purposes: ESG improvements, supply chain risk assessment, inventory and capacity planning, and verifying sustainable certifications (scope certificates alongside transactional certificates).

Fibre-forward tracking approaches allow for real-time digital tokenisation of the flow of product combinations, allowing for volume reconciliation, and trustworthy auditing disclosures on blockchain enabled ledgers. garment-backwards approaches follow a more traditional traceability pursuit, supplier data requests to bring visibility to your facility landscape and associated ESG data points.

For chain of custody models supported, article and lot-level traceability, as well as identity preserved and segregated models take central importance as sustainable product claims and cotton origin verification holds high importance for brands and retailers.

And finally, interoperability between Supply Chain Traceability Platforms and other supply chain softwares (ERP, PLM), certification systems, and physical tracer technologies is at the core of implementation operations. Thus improving data transmission and validation between industry players.

# PART 2:
# CIRCULARITY PLATFORMS

## 2.1: INTRODUCTION

### WHAT ARE CIRCULARITY PLATFORMS?

### CIRCULARITY PLATFORMS (PRODUCT PASSPORTS)

Circularity platforms (product passport) aim to digitise the operations of a product once it has been created, enabling an interactive post-gate circular economy. This allows for the communication of product criteria (e.g. material weight composition, certification, sale history) to consumers, and stakeholders via digital product passports. Facilitating key use cases for brands: Product authentication, anti-counterfeiting, re-commerce, re-sale, and visibility of material weight composition for sorting and recycling purposes.

The supply chain scope for circularity platforms (product passport) is Tier 0 to end of use / gate to cradle.

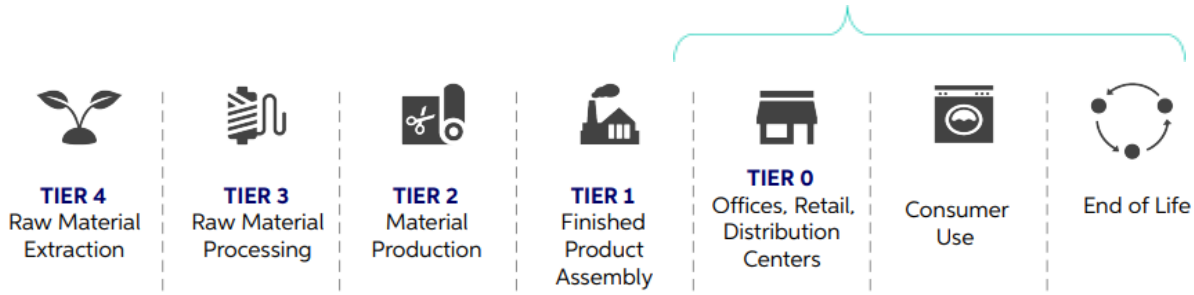



**FIGURE 16: SUPPLY CHAIN SCOPE OF CIRCULARITY PLATFORMS (PRODUCT PASSPORTS)**

### CIRCULARITY PLATFORMS (WASTE MAPPING)

In addition, There are growing digital solutions focused on waste mapping for collection, segregation, and recycling purposes. Some solutions also create databases to matchmaking between players outputting waste, and players recycling waste.

The supply chain scope for circularity platforms (waste mapping) can differ depending on whether the platform is tracing and allocating pre-consumer or post-consumer waste.

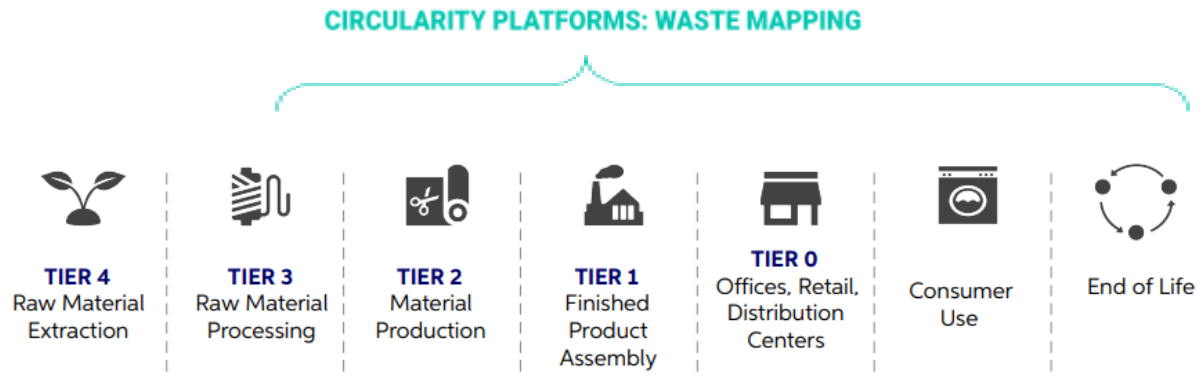



**FIGURE 17: SUPPLY CHAIN SCOPE OF CIRCULARITY PLATFORMS (WASTE MAPPING)**

# CIRCULARITY PLATFORMS BENCHMARKED IN THIS REPORT

Below in FIGURE 18 shows all Circularity Platforms benchmarked in the report, alongside a Fashion Readiness score out of five, rated by the following three criteria (Fashion for Good's subjective assessment). This score is to provide a high level idea of fashion industry performance, and is subject to change and critique from our partners. These platforms were scouted via desktop research and/or already established relationships with Fashion for Good.

**FASHION READINESS CRITERIA:**

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**1. Supplier, brand, and retailer engagement already in fashion industry**

- Ecosystem collaborations (e.g. with standard certifications)
- Implementations

**2. How developed their offering(s) are, based on (See FIGURE 19) :**

- Focus
- Software type
- Site Verification Supported
- Interoperability  Portability
- Interaction with Certification
- & Audits

**3. Fashion specific knowledge**

- Industry focus on textiles for more impactful implementation strategy support with brands
- Integration experience with SCTPs

| CIRCULARITY PLATFORMS | | Fashion Readiness (scale 1 to 5) |
|---|---|---|
| SUB-CATEGORY | SERVICE PROVIDER | |
| PRODUCT PASSPORTS | Arianee | 5 |
| | Avery Dennison | 5 |
| | Circular.Fashion | 5 |
| | Cypheme | 2 |
| | EON | 5 |
| | Everledger | 4 |
| | MonoChain | 5 |
| | Provenance | 5 |
| WASTE MAPPING | Empower | 4 |
| | Reverse Resources | 5 |
| | Satma | 4 |

**FIGURE 18: CIRCULARITY PLATFORMS CATEGORISED AND BENCHMARKED.**

# 2.2 CAPABILITIES

## *WHEN AND WHY SHOULD CIRCULARITY PLATFORMS BE USED?*

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## CIRCULARITY PLATFORMS (PRODUCT PASSPORTS)

Circularity platforms (product passport) should be used to track, trace, and communicate information related to a finished product. Creating digital product passports to communicate product information and engage consumers and circulators within circular market spaces.

This is done by bridging the physical and digital worlds of the product via QR code, NFC, and/or RFID technology that, once scanned, opens the digital product passport on cloud connected hardware devices (phones, tablets, computers). Thus overcoming digital communication barriers, so product data can be easily accessed and shared across stakeholders in the circular ecosystem space, maximising the value of product and material recovery value and enabling new business models such as resale, rental, and recycling to implement and scale.

**PRODUCT INFORMATION POTENTIAL DIGITISED:**

- Brand details
- Product details
    - Size
    - Resale history
        - Resold
        - Repaired
        - Recycled
- Material contents and composition
- Original manufacturing facility

**THERE ARE TWO MAJOR STEPS TO PRODUCT PASSPORT DIGITISATION[46]:**

1. Digitisation of the product:
    a. Embedding a physical tag tracer (QR code, NFC, and/or RFID technology) onto the garment and creating a digital product passport of product criteria, and associated information on a cloud based solution.
    b. Pursuing interoperability between the cloud based product passport and a Brand's and/or suppliers ERP/PLM systems for automated exchange of data points.

**THIS SUITS BRANDS WHO WISH TO IMPLEMENT POST-GATE TRACEABILITY TO GUIDE:**

- Circular business models[47]
    - Re-commerce
    - Re-sale
    - Re-pair
    - Sorting and recycling operations
- Anti-counterfeiting
    - NFT product passports to protect brand identity for re-commerce

**HOUSING AND ALLOCATING DATA, NOT VERIFIERS**

Circularity Platforms (Product Passports) focus more on obtaining and allocating data to industry players via cloud engines,rather than verifying product and material data points. The input data is usually defined by the brand and associated stakeholders, whilst the product passport platform holds and exchanges information to relevant parties in the circular economy space.

## CIRCULARITY PLATFORMS (WASTE MAPPING)

Are in demand and scaling at a fast pace due to industry wide demand to source and recycle textile waste. These platforms perform waste management inventory control and matchmaking to connect fashion brands, manufacturers, and circulators by building cloud-based and blockchain digital infrastructure to match feedstock with recyclers. Below are three key innovators that are focused in this space:

**EMPOWER**

**REVERSE RESOURCES**

**SATMA**

[46] Source: Natasha Franck Digital ID to Scale Circular Systems. Thursday, 13 October, 2022.
[47] Please refer to the circular business model landscape on the Fashion for Good partner portal for more information on circular business models


**FIGURE 19: PROVIDES AN OVERVIEW OF THE CLAIMS MADE BY CIRCULARITY PLATFORMS (BOTH PRODUCT PASSPORTS AND WASTE MAPPING) ON THEIR FOCUS AREAS AND CAPABILITIES**

# 2.3 INTEROPERABILITY

## *WHICH OTHER SYSTEMS AND DATA CAN THEY WORK WITH?*

### INTERACTION WITH SUSTAINABILITY STANDARDS

As with their supply chain platform counterparts, the system should be able to integrate with key ESG standards bodies in the textile industry to automatically and reliably verify the environmental, social or governance sustainability credentials of manufacturing sites along the entire supply chain. A robust traceability system must reliably verify the ESG credentials of all participating actors across the textile supply chain.

As scope certificates sustainability standards are out of supply chain scope, most platforms can house and communicate them to consumers via interactive RFID and NFC tags (but not verify). Linking product information via phone apps to customers, presenting material weight composition, tips to recycle/re-sell, linking re-commerce industry nodes.

### NFT SECURITY

A large trend in how use-case has defined design is through the use of NFTs to protect the identity of a product, allowing informational integrity from brand to consumer. Monochain prides itself on NFT functionality for anti-counterfeiting purposes on an updated ethereum blockchain ledger (better renewable energy consumption)... And the AURA blockchain consortium's main USP is the use of product tokens to protect against the selling of fakes. These are appropriate circularity platforms for luxury brands looking to protect brand image.

### CIRCULAR SYSTEM INTEGRATION

All circularity platforms have API or integration capability with other systems and softwares.

- Collaboration with re-sale / ecommerce platforms
- Collaboration with sorters and recyclers
- Collaboration with SCTPs

Looking forward more broadly in this space, a key question is the interoperability potential with sorting and recycling facility systems to help accelerate the operational efficiency of recycling processes.

# 2.4 CONCLUSIVE STATEMENTS

## CIRCULARITY PLATFORMS

The operational performance of Circularity Platforms (Product Passports) are being moulded by incoming legislation that requires products to have environmental and material weight composition disclosures (PEF, Digital Product Passports). Furthermore, with the fast acceleration of circular market spaces in the fashion industry, coupled with consumer priorities to buy second-hand, brands must pursue the digitisation of finished products to enable consumer engagement for re-sale information, social and environmental product life-cycle data, and NFT protection of product identity for anti-counterfeiting purposes.

Circularity Platforms (Waste Mapping) have a strong operational business case to track and trace both pre-consumer and post-consumer waste. And hold a wider client base, not only dealing with consumer facing players (retailers and brands), but also pre-consumer stakeholders; manufacturers suppliers, sorters, recyclers.

There has been a smaller number of Circularity Traceability Platforms that have matured in comparison to Supply Chain Traceability Platforms. This is mainly due to the delayed business case for post-gate circular business models (re-commerce, re-sale, anti-counterfeiting, recycling) compared to improving digital traceability and supply chain inventory control.

# PART 3: APPENDIX

## TRACEABILITY KEY

With so many various non-financial data points that can be carried and communicated by different traceability systems. Fashion for Good supports Opara's (2003) taxonomy of the six key elements of traceability that constitutes constitute the food supply chain traceability system[48] (sub-bullet points have been adapted ).

### 1. PRODUCT TRACEABILITY:

- Physical location of a product at any stage in the supply chain
- Fibre Type
- Material type
- Inventory management
- Product recall

### 2. PROCESS TRACEABILITY:

- Manufactucturing process applied
- Quality control inspections
    - type and sequence of activities affecting the product (cause, location, time; chemical, physical, environmental, and atmospheric factors), compliance standards and regulations with governmental entities, and collaboration among food supply chain entities.
    - E.g. Smartext
- Type and origin of inputs such as fertilisers, chemical sprays, livestock, feed, additives, and chemicals for preservation.
- E.g. Organic certification

### 3. GENETIC TRACEABILITY:

- Genetic product constitution, type and origin of ingredients, information on planting materials (seed, stem cuttings, tuber) to create the original product.
- E.g. Oritain

### 4. INPUT TRACEABILITY:

- Determines type and origin of inputs such as dyes, chemical sprays, additives.

### 5. DISEASE AND PEST TRACEABILITY:

- Involving the epidemiology of pests, bacteria, viruses, and emerging pathogens, which may contaminate food. (not so applicable to fashion).

### 6. MEASUREMENT TRACEABILITY:

- Measurement standards, length, depth, precision to trace, quality control, and type of traceability.

[48] http://www.toknowpress.net/ISBN/978-961-6914-02-4/papers/ML13-998.pdf
Opera, 2003, Traceability in agriculture and food supply chain: A review of basic concepts, technological implications, and future prospects

# PROCESS OF TRACING AND VERIFYING TRANSACTION AND SCOPE CERTIFICATES FOR SUSTAINABILITY STANDARDS:

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## SUSTAINABILITY STANDARD EXAMPLES

GOTS, BCI, TE.

## CERTIFICATION BODY EXAMPLES

CONTROL UNION, ECOCERT, SGS.

**FIRST PROCESS**

Obtaining product and certification data from the supply chain floor:

***How a Supply Chain Traceability Platform can help:***

- Integrating with supplier ERP and VMS systems to pull non-financial data points and processes for buyer visibility
- Training stakeholders to use software for inventory visibility and certification management

**SECOND PROCESS**

Verifying data with third party certification body:

***How a Supply Chain Traceability Platform can help:***

- Verifying certification against inventory and weight of product
    - **Data Point**: Transaction Certificate
- Verifying certification against site facility operations
    - **Data Point:** Scope Certification
- Reducing data lifecycle management of verifying the certificates of incoming inventory. Allowing for real-time verification of certificates with third party certification bodies.

# BRAND USE CASES: SUPPLY CHAIN TRACEABILITY

The table below outlines key traceability use cases for brands and retailers. The left column displays a traceability maturity spectrum from top to bottom from basic-level and expert-level reasons for implementation of SCTPs.

| | |
|---|---|
| **BASIC-LEVEL** | • Your brand is at the beginning of your traceability journey, sitting at Phase one of traceability implementation (see **Figure 8**).<br>• Your brand has just started to create visibility of your supply chain facilities past Tier one.<br>• Your brand is still determining ESG motivations, traceability use cases and key product journeys to trace. |
| **EXPERT-LEVEL** | • Your brand has good supply chain mapping visibility past tier one, to tier three (perhaps even tier 4) for a majority of your product journeys.<br>• You are already verifying and communicating ESG information for your product journeys.<br>• Now you're looking into advanced traceability mechanisms (fibre-forwards tracking, wastage factor modelling) to further build sustainability agendas, and get ahead of future corporate due diligence legislation. |

**FIGURE 20:** Traceability maturity spectrum, definitions

The table below provides guidance for brands to understand where they sit on the spectrum:

| | **USE CASE** |
|---|---|
| **BASIC-LEVEL** | **Supply chain mapping** |
| | **Supply chain risk assessment** |
| | **Compliance management (meeting supply chain legislation)** |
| | **Volume Reconciliation** |
| | **Wastage factor modelling** |

| | |
|---|---|
| | **Trustworthy auditing disclosures** |
| **EXPERT-LEVEL** | **Fibre-level traceability** |

**FIGURE 21:** Brand use cases and business relevance for integrating Supply Chain Traceability Platforms, based on a traceability maturity spectrum