UNECE Project document

Pilot #1 Implementing a blockchain technology for traceability and due diligence in the cotton value chain in support of a circular economy

1. Background[1]

Improving transparency and traceability has become a priority for the garment and footwear industry in order to increase its ability to manage its value chains more effectively; identify, mitigate and address labour and human rights and sustainability impacts; combat counterfeits; and manage reputational risks.

Today, many companies have a limited view of the network of business partners within their value chain. Most can identify and track their immediate (tier 1) suppliers, but information is often lost about the suppliers of their suppliers – a UNECE study demonstrates that only around 34% of fashion companies implement tracking and tracing in their supply chain – and most of these reach Tier 1 only (UNECE study, 2019).

Nonetheless, the implementation of traceability in supply chains is a complex issue because it requires the collaboration of all stakeholders and the deployment of shared, reliable technical solutions. The global fragmentation of production is a key feature of the fashion industry which is further complicated by the prevalence of subcontracting and informal work, especially in lower supplier tiers. As a result, it has been difficult to provide consumers with information about product provenance

Advanced technologies (distributed ledgers such as blockchains, AI, machine learning, Internet of Things) can enable fashion industry actors to improve supply chain transparency across a variety of ecosystems by making available all information about product origin in a transparent and trustworthy manner by notably assigning a digital identity to the product.

Cotton is a key sector for the textile and garment industry because it is the world's most widely-used natural fiber, with an approximate yearly global production of 20 million metric tonnes (mt). It is a vital industry and a critical source of economic growth which contributes to the livelihoods of more than 350 million people, mainly smallholder farmers in developing countries. Nonetheless, cotton production has substantial environmental and social impacts which are increasingly interconnected and trickle down to negatively impact cotton producers.

Cotton production represents 6 percent of global pesticide use and is correlated with pervasive land degradation and important water consumption. One t-shirt requires around 2,700 liters of water so cotton-clothing production on a massive scale contributes to the depletion and pollution of local water sources. The overuse of petroleum-based fertilizers has a highly negative impact on Cotton farmers' occupational health and safety as reflected in growing rates of chemical poisoning. In addition, the volatility of market prices and the uncertainty stemming from current purchasing practices have put cotton farmers into

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[1] Source: Background note UNECE 2017 / Textile Exchange, 2025 Sustainable Cotton Challenge First Annual Report 2018

precarious situations which result in widespread poverty, child labour and excessive indebtedness.

Many companies have already engaged with global cotton sustainability programmes and have started to shift from the use of conventionally-grown to organically-farmed cotton. In this context, and in connection with the UNECE project for advancing transparency and traceability of sustainable value chains in the garment and footwear sector, a first pilot will focus on a blockchain solution in cotton value chains.

The pilot will be implemented in collaboration with experts from brands, manufacturers, raw material providers, standard-setting bodies and technology providers. It will cover all the production steps of the value chain along with relevant business data and sustainability data elements identified in a mapping conducted by UNECE and UN/CEFACT experts, and a selection of certificates linked to specific hotspots of the cotton value chain (i.e. certificate of origin, certificate of organic cotton, and the zero discharge and hazardous chemicals substances self-assessment tool), to ensure the traceability of a product type (i.e: a shirt/a suit, TBC) and assess the pilot's scalability to other textile fibers.

2. Contribution to the UNECE-ITC project

This project directly contributes to UNECE project "Enhancing transparency and traceability of sustainable value chains in the garment and footwear industry" which is jointly implemented with ITC, in collaboration with the ILO, and is financially supported by the European Commission. In particular, this activity supports project Activity A2.1, "Pilot the use of the transparency and traceability policy framework, standard and guidelines for one country and 4 companies".

3. Implementing partners

The project will be led by UNECE.

It will be jointly implemented by the following partners:

▪	Hugo Boss	Brand
▪	Weba	Spinning, Fiber Processing, Weaving, Dyeing, Assembling, Finishing
▪	Albini	Spinning, Dyeing, Weaving, Finishing
▪	Filmar	Farming, Spinning, Fiber processing
▪	Global Organic Textile Standards	Certification
▪	OEKO-TEX	Certification
▪	Zero Discharge of Hazardous Chemicals	Self-assessment tool

And in collaboration with the following entities:

- Vivienne Westwood (**TBC**)
- Organic Cotton Accelerator or Better Cotton Initiative (**TBC**)
- Central Institute for Cotton Research (**TBC**)
- Textile Exchange
- Global Organic Textile Standards (GOTS)
- OEKO-TEX
- Social Accountability International (**TBC**)
- Cittadellarte Fashion B.E.S.T (**TBC**)
- The Italian Ministry of Economic Development (**TBC**)
- OECD (**TBC**)
- UNIDO (**TBC**)

4. Overall Objective

OO: To enhance the traceability and due diligence in the cotton value chain through the implementation of blockchain technology, to support a circular economy approach

5. Expected accomplishments

EA1: Proof the possibility of increased connectivity and cost-efficiency based upon the use of blockchain technology and strengthened capacity to source more sustainably for retailers, brands and manufacturers along the cotton value chain

EA2: Demonstrate the capacity of companies operating in the cotton value chain to take risk-informed decisions and use a set of internationally agreed traceability and sustainability standards;

6. Indicators of achievement

IA2.1 A Proof of Concept (PoC) for a transparency and traceability blockchain-based system for sustainable cotton value chains, covering all the production steps from seed provider to final consumer with relevant business and sustainability data elements. in line with the OECD due diligence guidelines (for selected KPIs), is completed by the end of 2020;
IA2.2 At least two project documents for undertaking additional PoCs in other plant-based, animal-based, synthetic, man-made fiber, linen or leather supply chains are developed by the end of 2020;
IA2.3 One technical solution to address the issue of accessing data on sustainability performance is identified as part of the PoC by the end of 2020, with the overall aim of significantly reducing the paperwork burden from a cost-effective and time-saving perspective for the project partners involved.

IA1.1 At least 1 brand and 4 manufacturers/farmers participate in the pilot project and fully test the blockchain-based system developed by the project by the end of 2020;
IA1.2 At least 30 stakeholders (including brands, manufacturers and farmers) are trained in the use of the blockchain system developed by the project by the end of 2020.

7. Activities

A1.1 Definition of the value chain and data model: mapping of the value chain, parties involved, with identification of the sustainability hotspots, and B2B transactions to be covered from seeds to consumers, selection of the information entities/data/ KPIs/ relevant standards and certificates that will be uploaded and exchanged through the blockchain (e.g. certificate of origin, certificate of organic cotton);

A1.2 Definition of the technology model and the traceability systems for the physical assets: including the definition of the digital twin to be used for the product/parts/components (e.g. DNA markers, HELIXA, RFIDs) and the necessary functions to be implemented;

A1.3 Analysis of the legal aspects of the blockchain pilot implementation (e.g. GDPR);

A1.4 Design of the IT data model, definition of data to be stored on- or/and off-chain, development of smart contracts, access concept to third party data bases (e.g. Oekotex STeP), API and Web development including the Front-End and User-Interface development (mock-up) and the integration into supply chain partners existing websites (certificates and products);

A1.5 Parallel testing of blockchain modules developed, integration test for partner certification and necessary KPI's stored on blockchain (off – and on-chain), supply chain testing from end to end (seed to product), going live with real data entry and testing of the application in project pilot countries (e.g. Egypt for seeds, farming and ginning, Italy and Switzerland and different countries in the value chain). Pilot feedback with an immediate error fixing for road blocking problems and an after pilot fine tuning of the blockchain concept and IT adaptation
A1.6 Summarisation of pilot project results in a project pilot report/case study presenting results achieved, challenges and lessons learned and, by the end of 2020, the development of project documents for replicating the results in at least two additional fashion supply chains (for example, other plant-based, animal-based, synthetic, man-made fibers, leather).

A2.1 Identification and mapping of key stakeholders and possible beneficiaries for the project pilot and coordination with identified stakeholders and beneficiaries;

A2.2 Selection of brands, manufacturers and farms to participate in the pilot project and support to these companies throughout the implementation of the pilot project;

A2.3 Development training materials targeting potential end-users, including for webinars and online tutorials;

A2.4 Training of at least 30 experts (brands, manufacturers and farmers, standards/certification entities) including managers, technical staff and end users, on the key components of a blockchain system for traceability and due diligence in cotton value chains through a workshop (2-day workshop) and online tutorials/webinars;

A2.4 Organization of a concluding conference (half-day) to present and disseminate the project pilot results (e.g. in connection with the OECD Due Diligence or Blockchain Forums).
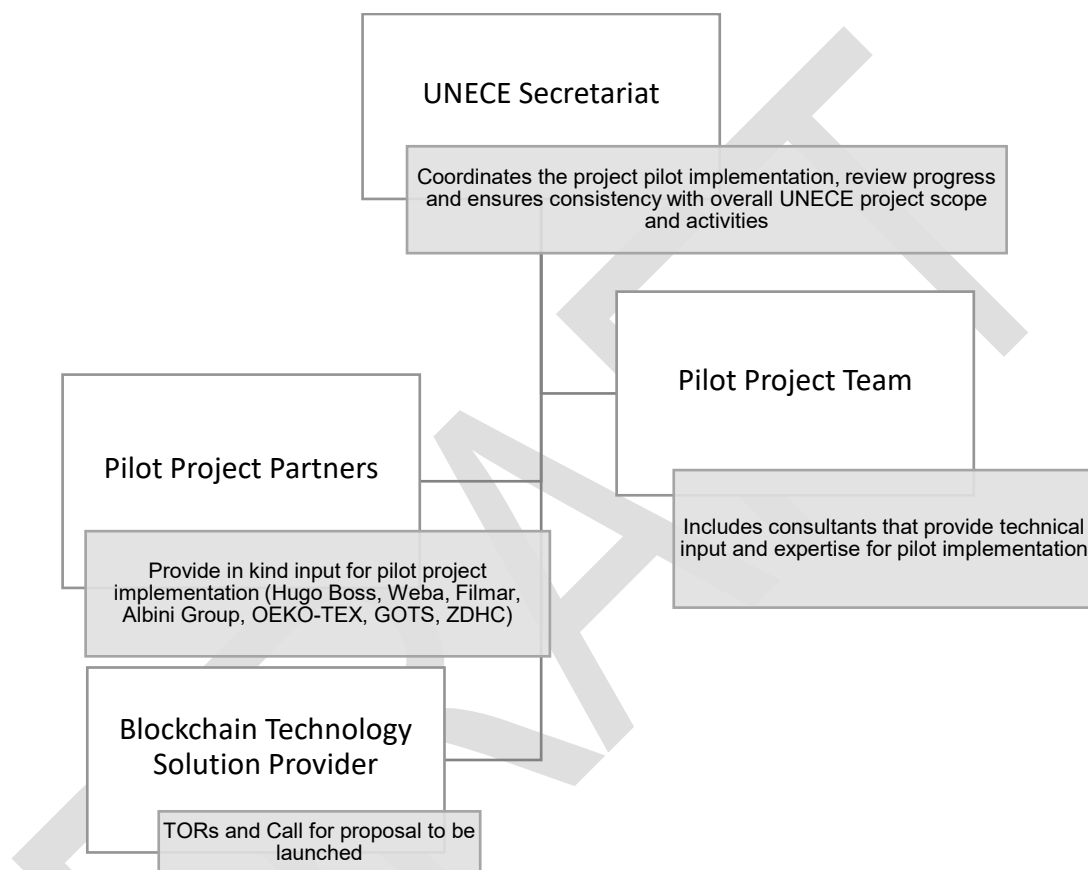
8. Implementation timeframe for the activities
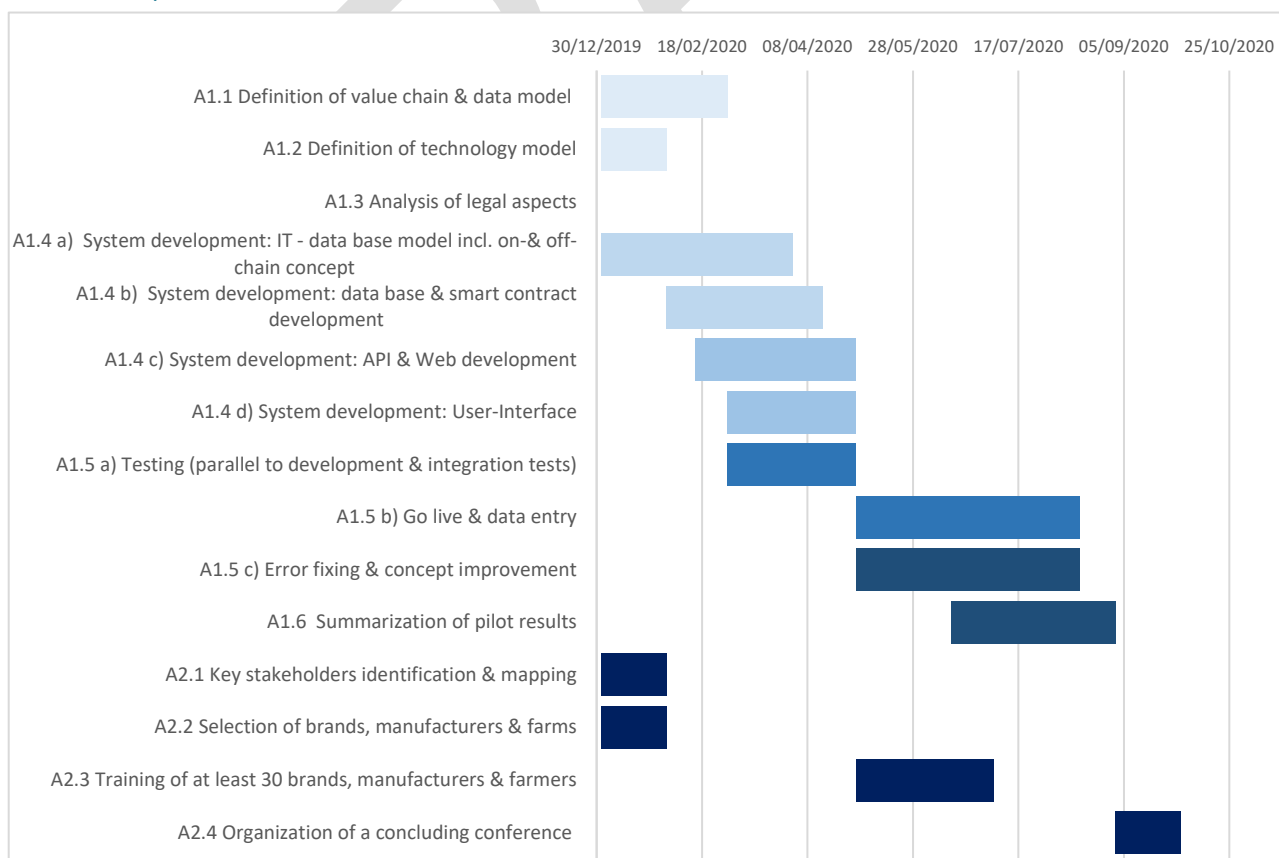
9. Key events to present pilot progress in 2019-2020

- UN/CEFACT Forum 30-31 October 2019
- OECD Due Diligence Forum 11-13 February 2020
- UN/CEFACT Forum April 2020
- UN HLPF July 2020
- OECD Blockchain Policy Forum September 2020

10. Pilot project governance structure

UNECE Secretariat

Coordinates the project pilot implementation, review progress and ensures consistency with overall UNECE project scope and activities

Pilot Project Team

Includes consultants that provide technical input and expertise for pilot implementation

Pilot Project Partners

Provide in kind input for pilot project implementation (Hugo Boss, Weba, Filmar, Albini Group, OEKO-TEX, GOTS, ZDHC)

Blockchain Technology Solution Provider

TORs and Call for proposal to be launched

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With support of:

European Commission

11. Annex

11.1 Initial overview of the supply chain model

A Cotton Supply Chain model and players (Egyptian cotton example)

11.2 Initial mapping of relevant standards and certifications for the cotton value chain pilot
22 October 2019

Certifications in a Cotton Supply Chain (WEBA "Tier1" example)

Certifications in a Cotton Value Chain (general)