CIRPASS
Digital Product Passport

D3.1 Annex:
DPP Related Initiatives

(V9)

March 2024

Funded by
the European Union

Document Revision History			
Date	**Version**	**Author/Contributor/Reviewer**	**Summary of Main Changes**
10/05/2023	V1	SLR, CEA, Polimi	3 additional initiatives
01/06/2023	V2	SLR, CEA, Polimi	13 additional initiatives
03/07/2023	V3	SLR, CEA, Polimi	8 additional initiatives
01/08/2023	V4	SLR, CEA, Polimi	6 additional initiatives, 1 update
07/09/2023	V5	SLR, CEA, Polimi	6 additional initiatives
31/10/2023	V6	SLR, CEA, Polimi	3 additional
20/12/2023	V7	SLR, CEA, Polimi	10 additional
13/02/2024	V8	SLR, CEA, Polimi	2 additional, 1 update
28/03/2024	V9	SLR, CEA, Polimi	15 additional

CIRPASS Digital Product Passport

Preparing the ground for the gradual piloting and deployment of DPPs from 2023 onwards, focusing on developing a roadmap for prototypes in three value chains: electronics, batteries and textiles.

Grant Agreement: 101083432
Theme: DIGITAL-2021-TRUST-01
Start Date of Project: 01 October 2022
Duration: 18 months

Introduction

This document is a supplementary Annex to the CIRPASS report **'Benchmark of existing DPP reference architectures'** (CIRPASS Deliverable 3.1). This Annex provides summary profiles, organized according to a common template, of initiatives that are related to the Digital Product Passport (DPP). It thus provides the European Commission and the DPP stakeholder community with an overview of potentially relevant services and products. Summary details of 32 initiatives were included in the original report. As the CIRPASS consortium continues to collect information on numerous additional DPP-related initiatives, updates to this Annex will be regularly published on the CIRPASS website.

Please note that the information contained in these summary profiles was provided by the organisations responsible for the initiatives. Minimal, if at all, editing is performed by the CIRPASS consortium on the contributions received.

Please note that the CIRPASS consortium accepts all requests to be included in this Annex.

Please note that the summary profiles of DPP-related initiatives are published for information purposes only. The CIRPASS project does not endorse or promote any specific initiatives.

The table below lists the DPP-related initiatives included in this Annex. The summary profiles that have been added or updated (with revised information provided by the organisation responsible for the initiative) in this version of the Annex are highlighted with colour (green for new and gray for updates).

This is the final edition of this document. CIRPASS-2 will develop a **DPP Stakeholder Exchange Forum platform**, an online interactive cloud collaboration environment. This platform will be crucial in the creation of a market for DPPs, providing visibility and transparency of DPP solution providers and DPP pilots. The platform will enable participants to showcase DPP innovations, expertise, use cases, and services. This community building platform will be designed to facilitate clustering and the creation of meaningful connections between organisations. This forum will be used both to support project objectives and the general DPP stakeholder community, with particular emphasis on the involvement of SMEs. This platform will be set-up and beta-tested over the first few months of CIRPASS-2 and then opened to the general DPP community.

No.	Initiative name
1	3E Exchange
2	Anima Blockchain
3	Antares Vision Track &Trace
4	ARIANEE DPP
5	atma.io
6	Aura Blockchain Consortium
7	Authentic Vision Meta Anchor
8	**Authentique DPP**
9	BatWoMan

10	BP
11	Wordline B-TraaS
12	CableDPPs - PULRPASS™ and HELIPASS™
13	Charming.Digi
14	Checkpoint DPP Carrier Labeling Solutions'
15	Circlolink DIGITAL PRODUCT PASSPORT via RFiD THREADS®
16	**Circular Concierge**
17	Circular.fashion
18	Circularise/SaaS
19	Circulor
20	CircThread
21	COSMILE-App, health&media
22	**Countermark**
23	**CREDZ**
24	CYCLANCE
25	Cycle Platform
26	DDCC
27	DIBICHAIN
28	DigiPrime
29	**Digital Product Passport**
30	**DigiTrax**
31	**Dippi**
32	DNV
33	Dyne
34	EasyBat
35	Elision Digital Product Passport
36	Environmental Data in Industry 4.0
37	EON
38	ENSESO
39	EPEAT Ecolabel
40	eReuseDPP
41	**Eslando Relabel**
42	ettos
43	FEDeRATED
44	**FFBS ID**

45	**Fluxy - GS1 Saas Platform**
46	GTS
47	Goods Tag GmbH
48	Infinite X
49	Internet of Traceability
50	itmatters
51	Kezzler
52	Log Data Hub
53	Loopcycle
54	**LUKE**
55	**LW3 - Phygital Product Passport (P3)**
56	Lynx Technologies
57	MadeBy
58	Minespider
59	Octo + iWay
60	Origin Trail Decentralized Knowledge Graph (DKG)
61	The OK Supply Chain Management platform
62	Peppol
63	Pimster
64	ProDecipher
65	PRODUCT DNA®
66	QI-Digital
67	QI-Cloud
68	RCS BP
69	Renoon
70	RR
71	RETEXCYCLE
72	SecureTag
73	Sloer
74	SORGA Technology
75	Spherity GmbH
76	**SPINISE**
77	STVgoDigital Texjourney
78	Surfboard Digital Passport
79	Tappr

80	TripleR
81	TextileGenesis
82	The ID Factory Società Benfit
83	Tilkal
84	Tings
85	Trackit
86	Worldline TCS
87	Worldline TPD
88	TRACE
89	TRICK
90	TrusTrace
91	Twintag
92	Twinu
93	**UNISOT**
94	Vine
95	whatt.io
96	**World of Pi**
97	Ziri Dynamics
98	ZVEI DPP4.0

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3E Exchange (formerly Toxnot)

3E Exchange
3E Exchange's mission is to improve health and sustainability across the global supply chain by streamlining the chemical transparency process. 3E Exchange provides an efficient system for manufacturers to import chemicals data, provide insight into their hazard profiles, report on the results and create safer products. In December 2022, 3E announced the acquisition of Toxnot and rebranded the solution as 3E Exchange. Organisations use 3E Exchange to automate transparency reporting and compliance, easily collect hazard information, and reduce risks across their global supply chain. 3E Exchange scales from small businesses to Fortune 500 enterprises. https://exchange.3eco.com/

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects
The 3E Exchange Product Passport system is specifically designed to meet emerging product passport requirements, enable supplier data exchange today, and be easily expanded as guidelines evolve. Our proprietary data protections allow suppliers to mark chemicals as proprietary but users to still screen those proprietary chemicals against regulations such as EU

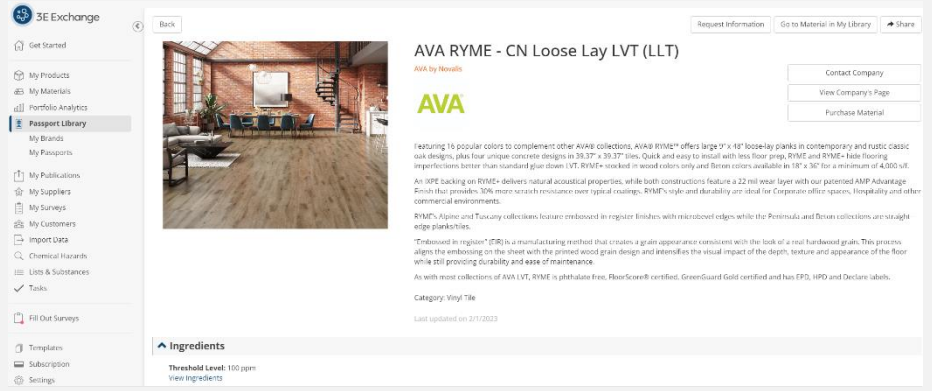
REACH or PFAS regulations. Simplified infrastructure allows for clear ownership and low cost. Suppliers can create a 3E Exchange Digital Product Passport for free and can automatically create an EU REACH, EU RoHS, CA Prop 65, and Product Circularity Data Sheet as part of the free account. All data fields are aligned with industry-standard initiatives & needs and are updated as terms and usage change.

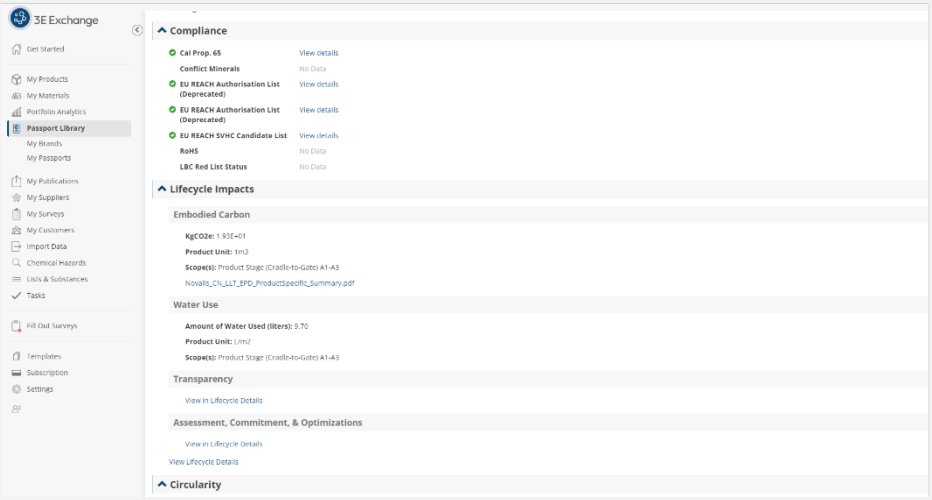
Maturity level and application sectors

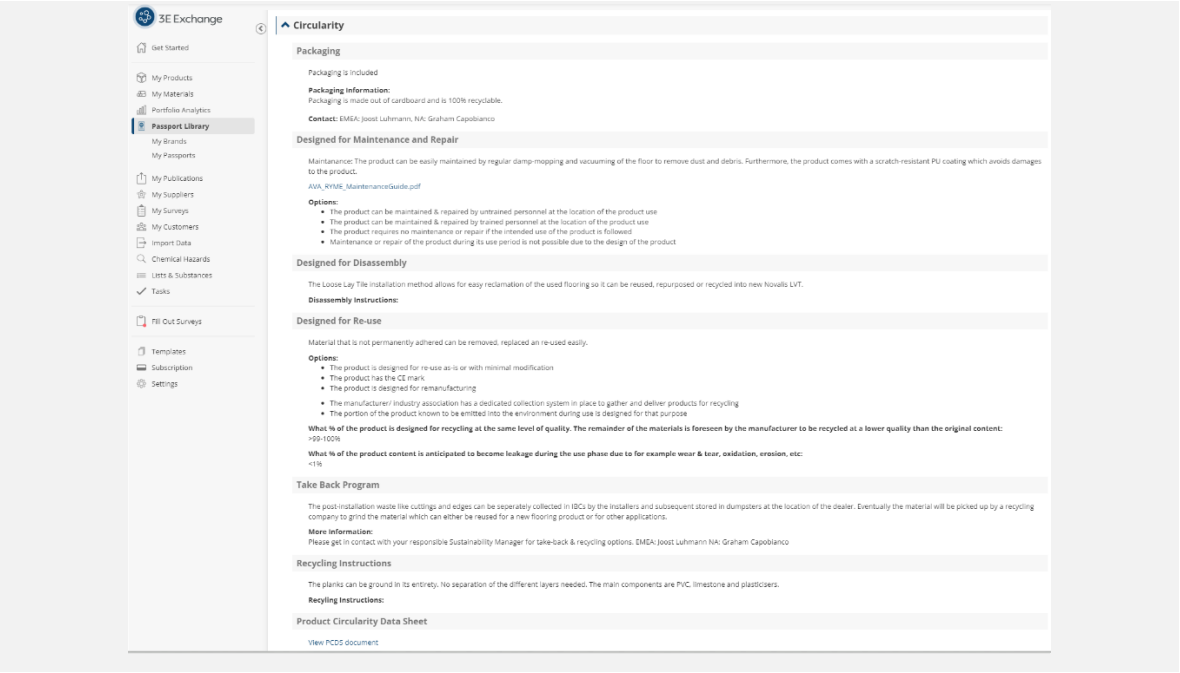
The 3E Exchange Product passports are live in the system and in use by thousands of users. Companies can enter full chemical ingredient disclosure, compliance data, sustainability data such as embodied carbon and water use, circularity information, recycled content, end-of-life options and more. We have companies from a wide variety of sectors using the system, including industrials, building products, chemical manufacturers, packaging, electronics and more. Passports can be published as public, restricted, or private, based on each company's desire. Some notable product passport publishers include: Covestro, Novalis, Steelcase, Kohler, AEP Span, Windmöller GmbH, and more.

Useful link to an example passport:

https://exchange.3eco.com/Exchange/Database/Detail/d3531fe3-9750-49b9-a546-fe19f7c5d90f






3E Exchange
Get Started
My Products
My Materials
Portfolio Analytics
Passport Library
My Brands
My Passports
My Publications
My Suppliers
My Surveys
My Customers
Import Data
Chemical Hazards
Lists & Substances
Tasks
Fill Out Surveys
Templates
Subscription
Settings
Circularity
Packaging
Packaging is included
Packaging Information:
Packaging is made out of cardboard and is 100% recyclable.
Contact: EMEA: Joost Luhmann, NA: Graham Capobianco
Designed for Maintenance and Repair
Maintanance: The product can be easily maintained by regular damp-mopping and vacuuming of the floor to remove dust and debris. Furthermore, the product comes with a scratch-resistant PU coating which avoids damages to the product.
AVA_KYME_MaintenanceGuide.pdf
Options:
The product can be maintained & repaired by untrained personnel at the location of the product use
The product can be maintained & repaired by trained personnel at the location of the product use
The product requires no maintenance or repair if the intended use of the product is followed
Maintenance or repair of the product during its use period is not possible due to the design of the product
Designed for Disassembly
The Loose Lay Tile installation method allows for easy reclamation of the used flooring so it can be reused, repurposed or recycled into new Novalis LVT.
Disassembly Instructions:
Designed for Re-use
Material that is not permanently adhered can be removed, replaced an re-used easily.
Options:
The product is designed for re-use as-is or with minimal modification
The product has the CE mark
The product is designed for remanufacturing
The manufacturer/ industry association has a dedicated collection system in place to gather and deliver products for recycling
The portion of the product known to be emitted into the environment during use is designed for that purpose
What % of the product is designed for recycling at the same level of quality. The remainder of the materials is foreseen by the manufacturer to be recycled at a lower quality than the original content:
>99-100%
What % of the product content is anticipated to become leakage during the use phase due to for example wear & tear, oxidation, erosion, etc:
<1%
Take Back Program
The post-installation waste like cuttings and edges can be seperately collected in IBCs by the installers and subsequent stored in dumpsters at the location of the dealer. Eventually the material will be picked up by a recycling company to grind the material which can either be reused for a new flooring product or for other applications.
More Information:
Please get in contact with your responsible Sustainability Manager for take-back & recycling options. EMEA: Joost Luhmann NA: Graham Capobianco
Recycling Instructions
The planks can be ground in its entirety. No separation of the different layers needed. The main components are PVC, limestone and plasticisers.
Recyling Instructions:
Product Circularity Data Sheet
View PCDS document

Anima Blockchain

ANIMA BLOCKCHAIN
ANIMA leverages cutting-edge technologies such as blockchain, NFC tags, and nanotechnology, Anima provides Digital Product Passports (DPPs) secured as Non-Fungible Tokens (NFTs). This innovation empowers brands in multiple ways: • Regulatory Compliance: Anima's solution ensures brands adhere to EU Digital Product Passport regulations, guaranteeing transparency and legality. • Customer Engagement: Through loyalty programs and customized offers facilitated by DPPs, brands forge deeper connections with their clients, enhancing customer loyalty and satisfaction. • Anti-Counterfeiting: Anima makes exact product replication impossible, providing an unparalleled defense against counterfeiting. • Supply and value Chain: DPPs enable brands to meticulously track the journey of their products ensuring integrity and authenticity throughout the supply chain. • Second-hand Market Verification: DPPs act as an infallible verifier, offering certainty about a product's origin and authenticity and ownership.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials	Others			

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

The ANIMA system is built upon the foundation of the Polygon blockchain this solution empowers a decentralized ecosystem for trust, security and verification.

At the core of the ANIMA Protocol lies the concept of tokenized DPPs, which serve as the cornerstone of the system's authentication process. These tokens are non-fungible, adhering to the industry-standard ERC-721 on the Ethereum blockchain. Each DPP encapsulates a distinctive physical product, complete with its individualized metadata securely recorded on the DL. Every NFT is linked to a NFC tag and/or an holographic QR and/or nanotech; these solution are impossible to be reproduced.

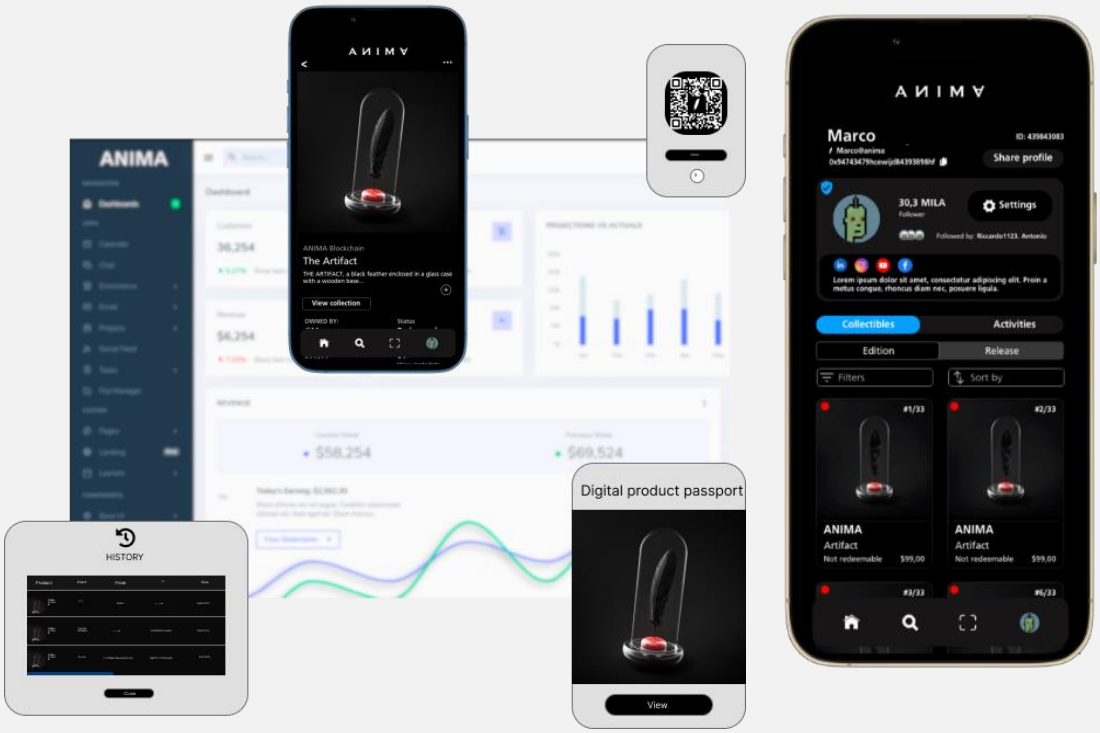
ANIMA gives the possibility to users to store DPPs in their personal area without the need of a web3 wallet, this solution enables brands to make adopt blockchain technology in an easier way. The ANIMA Protocol allows brands to connect their CRMs to ANIMA platform through special APIs that let them have a deeper view on their products and customers.

Maturity level and application sectors

ANIMA tokenized DPP are utilized in different sectors such as: Art, Design, Fashion, Lifestyle, Winery and spirits, Jewelery and more.

Our solutions are different:

- Digital product passport: an electronic document forged in blockchain that provides information about a product’s authenticity, and sustainability throughout its lifecycle.
- The NFT management platform allows users to securely mint, store, sell, and manage non-fungible tokens. It provides a streamlined experience for brands.
- ANIMA's NFC tags, Holographic QR codes and nanotech enables a cryptographically secure and efficient ownership transfers of products, ensuring indisputable proof of authenticity.
- Digital storage: Users can utilize the ANIMA platform to easily store the digital certificates without the need of a WEB3 wallet.
- APIs service to interact with blockchain technology and integrate it into their applications such as CRM or clouds.



Useful link:

https://animablockchain.com/

Antares Vision Track & Trace

Antares Vision Track & Trace
Antares Vision track and trace solutions guarantee the quality and integrity of products, from raw material to the end user, by creating a unique digital identity for each saleable item. Every product is associated with data assigning during its production and packaging processes and its status and location across the supply chain. By issuing unique identifiers on each saleable item, traceability can safeguard the valuable integrity of each product. Each unique identifier becomes the "digital passport" that will follow the item during each step of its supply chain, to the hands of the consumers, and up to the moment for recycling. Traceability solutions can support in many different aspects, i.e.: • Enhance circular economy activities • Show sustainability evidence • Facilitate recalls • Control product diversion • Create customer engagement • Guarantee the quality and originality of the product • Ensure the transparency of the supply chain • Manage returnable assets

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials		Others		

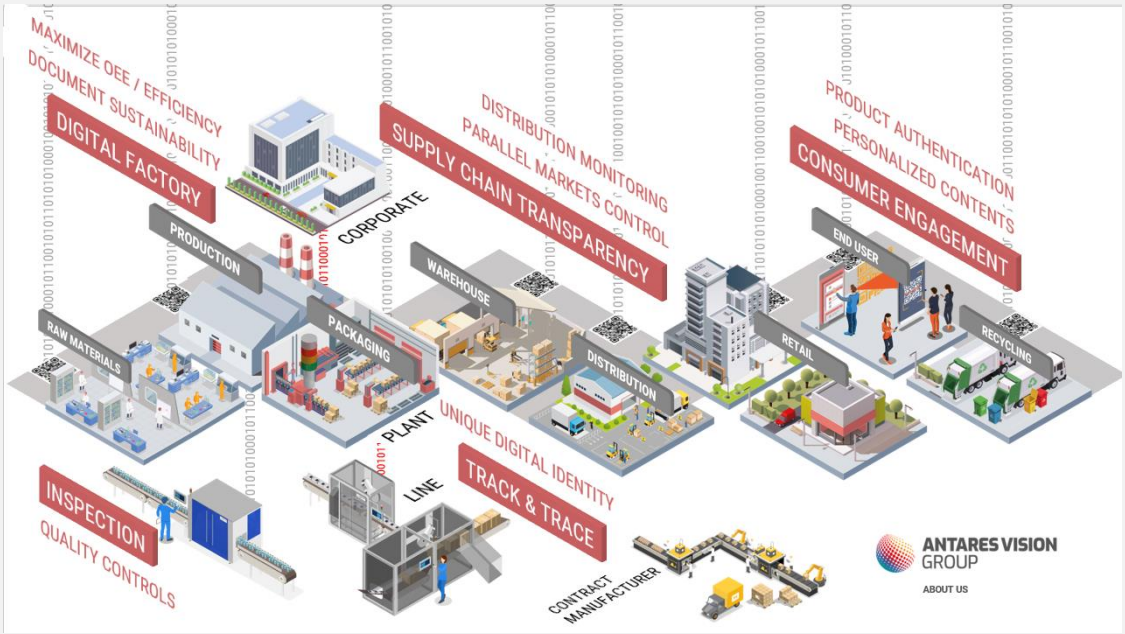
Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

The main advantage of Antares Vision track and trace solution is the fact it is a full stack solution. It means that it includes all the "blocks" needed to build up a full supply chain system. It is composed by 5 levels. Level 1 represents the devices: it includes hardware such as cameras, sensors, and printers. Level 2 represents the software implemented on the lines and it is necessary to manage the hardware. Level 3 is the software at site level, the big brain that allows to put in place the track and trace logic, such as the assignment of a unique identity to each item and the eventual aggregation levels. Level 4, usually provided on cloud as a Software as a Service (Saas), allows to connect globally all the actors of the enterprise. And finally, Level 5 is the level that permits to communicate data to players external to the supply chain. This level is frequently used to ensure regulation compliance. Every block is customizable to answer to the specific needs.

Maturity level and application sectors

Antares Vision launched its very first track & trace solution in 2009, when Turkey put in force a regulation that oblige the pharmaceutical producers to print a unique, serialized code on each sellable unit. From this moment, the solution has evolved, both because new regulations came into force and because other non-regulated sectors saw in the track and trace a very powerful solution to solve their supply chain issues. Nowadays, our solutions are applied widely in Life science, Beverage, Cosmetics, Food, Chemical, Textile and Medical Devices. Globally, Antares Vision has installed and currently in Production more than 3500 lines over 300 Production Sites and Distribution Centers.



Useful link:

https://www.antaresvisiongroup.com/

Arianee Tokenized DPP

Arianee Tokenized DPP						
Arianee enables brands to issue Tokenized DPP at scale using eco-friendly web3 technologies and NFT standards. Its tokenized DPP (enriched and dynamic NFTs) aim to accelerate the consumption revolution by unlocking 5 utilities (eg: by enabling high product circularity while extending product life cycle)						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
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IT architecture: Access control	**Level**	Simple		Advanced		
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IT architecture: Data use	**Labelling**	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)		Others		

Unique technical aspects
-Arianee is developing tokenized Digital Product Passports built on the Arianee Protocol which is based on public blockchain. It allows decentralised, independent, and secure verification so that all users can trust each other without relying on a single centralising third party. The Arianee protocol enables management of custom assets called certificates. Certificates are non-fungible tokens (NFTs) compliant with the Ethereum's ERC-721 standard. They represent a unique, either digital or real-life product with its unique metadata stored as a data imprint on a distributed ledger. The Arianee protocol is blockchain agnostic and easily deployable with any Ethereum compatible blockchain. Based on manufacturers' choice, DPP data is stored either on decentralised/distributed cloud service providers (IFPS) or less frequently on centralised cloud service providers (AWS, Microsoft, OVH etc..)
Maturity level and application sectors
Arianee tokenized DPP contributes to the acceleration of the circular consumption revolution in particular in the luxury, retail & fashion sectors by unlocking 5 utilities: - Upstream product information: it provides (incl. before buying) consumers with insight into the product manufacturing for transparency, traceability, and recycling - Certificate of ownership and authenticity: authenticity proof created at product inception, transferable with each ownership change for trust in resale (key enabler for circularity) - Product lifecycle management tool: maintenance booklet records product lifecycle events and offers add-on services (key enabler for durability) - CRM tool: maintain a perpetual, direct connection with the product holders and enable access to exclusive experiences **Useful links:** Arianee | Leading NFT Platform for Digital Product Passports and a use case in the luxury sector Arianee & BCG study: the case for native Digital Product Passport tokenization

Atma.io

atma.io							
End to end traceability platform.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labeling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			
Unique technical aspects							
atma.io is built on a state-of-the-art microservices based architecture that follows domain-driven-design principles. This architecture and design split the overall functionalities into loosely coupled services that can be developed, operated, and scaled independently. We are following a polyglot approach for the individual microservices which means that we are employing different technologies that are best suited for the specific domain of the individual services (both, from a persistence layer and programming language perspective). For highly scalable inter-service							

communication, we utilise asynchronous messaging technologies and a variety of design patterns to enable both horizontal and vertical scalability. atma.io provides REST-ful APIs for data exchange with external systems and applications. Our standard APIs are GS1 EPCIS compatible to facilitate an easy data exchange with other systems. In addition, we have a standardised way to integrate with Blockchain and Distributed Ledger. Our platform features state-of-the art data security and is designed from ground up to be highly interoperable, and optionally offers a fully redundant set-up.

Maturity level and application sectors

The solution is used by 6 of the 20 biggest fashion brands and traces ca. 23 billion unique items. There are other sectors that utilise our solutions, i.e., food, pharmaceuticals, beauty, packaging, logistics and automotive. We are continuously enhancing our services, enabled by quantitative feedback from the process implementation, piloting and scaling up existing solutions. The atma.io platform provides a range of configuration options, ranging from enabling specific features and modules over use-case specific configurations down to data schemas. We implemented role-based access control for authorisation. User accounts can be created with different access rights and privileges. For both the product-level and the item-level, atma.io uses a flexible schema, allowing additional fields to be captured and managed. atma.io is designed and built for processing data at very large scale and throughput. For example, our Serialization API in the standard configuration provides the ability to process 300 requests per second with a payload size of up to 1000 identifiers per request. We enable consumers to interact with products directly via targeted, contextual and personalized experiences (resolver).

Aura Blockchain Consortium

Aura Blockchain Consortium							
Aura Blockchain Consortium is a non-profit organization dedicated to providing flexible blockchain solutions exclusively to luxury brands. We empower brands to establish Digital Product Passports (DPPs), safeguarding the authenticity, provenance, and ownership of their products on the blockchain. Together, we are creating a new standard, fostering trust and transparency, while championing sustainability and elevating the customer experience.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			**Others**		

Unique technical aspects

Aura Blockchain Consortium offers two groundbreaking solutions: the Digital Product Passport and Digital Collectibles, providing brands with advanced and innovative features including:

1. Authentication: With our ecosystem partners, brands can employ NFC chips, QR codes, fingerprinting, and diverse authentication solutions.

2. Blockchain Traceability: Record product data on the private or public blockchain for transparent traceability, including product history and certificates.

3. Digital Product Passport: Present selected data within a Digital Product Passport for a comprehensive product overview for the end consumer.

4. Ownership Management: Through the Digital Product Passport, customers can claim and transfer product ownership, facilitating seamless resale.

5. Enhanced Services: Aura Blockchain Consortium's Smart Contract Library allows brands to create a range of tokens—transferable or non-transferable—for services, event invites, physical products, loyalty rewards, and more.

Maturity level and application sectors

Today, Aura Blockchain Consortium proudly serves over 35 luxury brands across different categories of products, offering both public and private blockchain solutions. Our expertise is recognised in Digital Product Passports treaceability and Digital Collectibles, where we have several live use cases (see links below).

Empowering brands with ownership solutions, we can provide a unique blend of claim and transfer functionalities. Our adaptability is a testament to our commitment; we tailor our services to meet the evolving needs of brands, ensuring a seemless integration into their operations.

As a non-profit organization, our growth is not just a metric but a reflection of our dedication to advancing the blockchain landscape. Each year, we stride forward, enhancing our capabilities and expanding our network. Aura Blockchain Consortium stands for innovation and trust, fostering a future where blockchain transforms the luxury industry.

Useful links:

Some of our live use cases:

1. Prada: Eternal Gold https://lnkd.in/eDmW63-F
2. Louis Vuitton: LV Diamond https://lnkd.in/eB_VffuG
3. H. Moser & Cie: Moser Genesis https://lnkd.in/eVC9dXF7
4. Loro Piana: Gift of Kings® https://lnkd.in/ecWZ-DkY

Authentic Vision Meta Anchor

Authentic Vision Meta Anchor
Authentic Vision's patented Meta Anchor™ technology, which consists of the Holographic Fingerprint label, mobile authentication app, and real-time analytics capabilities, protects physical assets from counterfeiting and creates opportunities for brands to securely connect physical to digital assets. To align with the Digital Product Passport requirements, brand owners can leverage the Meta Anchor, which allows them to: Enable robust product authentication, giving consumers the confidence that the products they are sourcing are authentic. Gain real-time insights into product location throughout the supply chain, enhancing traceability for better inventory management and logistics optimization. Provide consumers with easy access to detailed product information or related documents. Analyze customer behavior, demand patterns, and engagement levels by means of real-time analytics capabilities. Easily verify product ownership and enables access to support for efficient after-sales service.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

Authentic Vision's advanced security label technology guarantees highest level of protection. The unique technology offers the following:

- Applicable on any surface for versatile usage.
- Patented Holographic Fingerprint with hologram shield, data matrix code, and server-side analytics.
- Authentication process verifies label ID and activation status through the 2D code.
- Computer vision technology authenticates Holographic Fingerprint™ for ultimate security.
- Tamper detection with the CheckifReal app on any smartphone without the need of further training or specialized equipment.
- Comprehensive approach guarantees product safety and counterfeiting prevention.
- Immediate availability and straightforward implementation, making the solution is ideal for large-scale and global adoption.

Maturity level and application sectors

Founded in 2012 with the goal to stop Fraud with Innovation for a market in need of a secure Mobile Authentication Solution, Authentic Vision's Meta Anchor® technology has been broadly deployed in the market. It is now experiencing growing demand in specific verticals and new digital use cases like Web3 and Phygitals. The company has a proven track record with global clients in various industries including wine & spirits, pharmaceuticals, automotive parts, brand licensing, network infrastructure, cable & connectivity, agrochemicals, and industrial parts.

Useful links:

https://www.authenticvision.com/technology/

https://www.authenticvision.com/brand-protection/

Authentique DPP

Authentique DPP

Authentique, launched in 2021 by the ORDRE Group, is focused on connecting physical products to digital assets through Vision AI, including Digital Product Passports (DPP's). Leveraging machine learning technology, Authentique offers a non-invasive solution that empowers consumers to utilise their mobile phone cameras when authenticating and verifying products.

Authentique also provides support to luxury brands including serialising, protecting, verifying, connecting, and reselling products. Its portfolio encompasses a range of offerings, from product verification services to a DPP SaaS (Software-as-a-Service) which holds comprehensive product information at individual product level.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	**Batch**	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	**Other**
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralised		Decentralised			
	Data storage location	Centralised		Decentralised			
IT architecture: Data transport	**Openness level**	Standardised	Proprietary	Data ports	Others		
	Data packaging	Data transfer		**API**			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			

Unique technical aspects

Authentique offers three key services: Authentique Advisory, Authentique Vision AI, and Authentique DPP.

Authentique Advisory: Authentique has a team of experts with specific knowledge and expertise to provide clients with external and pragmatic advice on implementing scalable DPP programs. This includes assessment of current product lifecycle information including traceability, integration with existing software platforms, agnostic advice on product connectors, DPP content and consumer insights.

Authentique Vision AI: Authentique uses its Vision AI solution that analyses the material surface structures of items with a smartphone and uses it for protection and future verification. By storing an item's material surface as a digital fingerprint, Authentique essentially creates a digital representation of the item itself. This AI-powered verification system enables brands to digitally “chip” items at any stage of the production chain, allowing brands to track and authenticate them.

Authentique DPP: Authentique’s DPP has flexibility and simple implementation as its core, allowing brands to select the technical foundations, product serialisation, traceability, connector, and consumer interface that best suits their business. Authentique DPP can incorporate any data, using any connectors, with data being stored anywhere depending on the brand’s needs. It also seamlessly integrates with Authentique Vision AI.

Maturity level and application sectors

The Ordre Group specialises in delivering technologies that power the business of fashion, with a clientele of over 150 luxury and fashion brands worldwide. Authentique has established, and continues to maintain, partnerships with several luxury brands including Patou. The Patou use case of Authentique DPP incorporated the following steps:

1) Protecting limited edition handbags (a collaboration with Sita Abellan)
2) Expanding protection to cover 19 SKUs
3) Extending protection to all products at Galeries Lafayette Paris (ongoing)

Useful Links:

Forbes: The Week In Web3: Gucci x Vans, ALTS By adidas, AMI Paris x ZEPETO, LVMH's Patou

Business of Fashion: AI Takes on the Fashion Industry's Counterfeit Problem

CNN: Spot the 'superfake': Fashion brands want you to be able to identify counterfeits

Bloomberg: There's a new way to prove a $38,200 watch is the real thing

Financial Times: Can AI end the era of the fashion super-fake?

BatWoMan

BatWoMan - Carbon Neutral European Battery Cell Production with Sustainable, Innovative Processes and 3D Electrode Design to Manufacture

The project BatWoMan, started in September 2022 and funded by the European Union's Horizon Europe research and innovation programme, aims to develop new sustainable and cost-efficient Li-ion battery cell production concepts, including a battery passport demonstrator. As part of the three-year-long project, data is collected from materials sourcing, a full life-cycle assessment, as well as from an optimised, data-driven manufacturing process. These data serve as the basis for the battery dataspace and passport, considering all processes from material supply to end-of-life.

The demonstrator within BatWoMan builds on cooperation with major European product passport initiatives, such as BatteryPass and CIRPASS; and dataspace standards and guidelines from Gaia-X and IDSA. The BatWoMan passport builds on and validates the prepared guidelines and standards and showcases a battery passport based on real production data from pilot factories that are members of the BatWoMan consortium.

Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
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	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

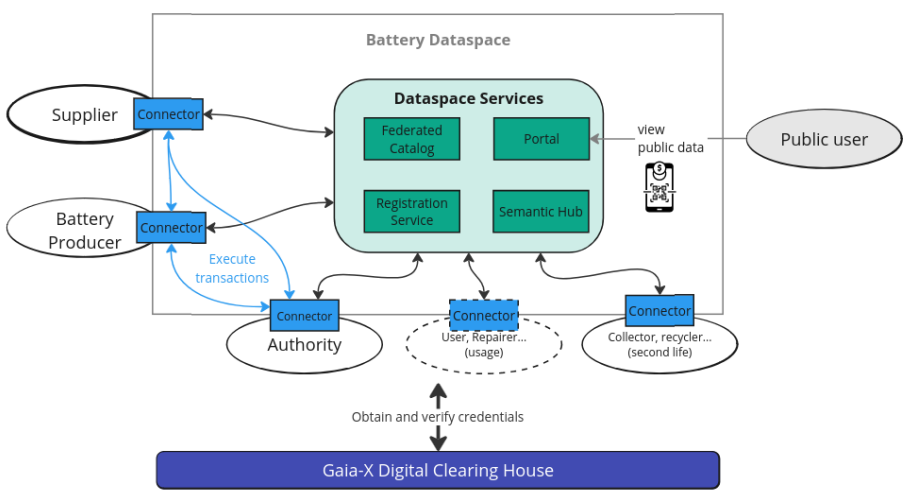
The BatWoMan battery passports builds on the IDS Reference Architecture Model and the Gaia-X Trust Framework to realise a decentralised ecosystem for sharing data, including individual battery passports. Participants and datasets are identified via verifiable credentials (VCs), that is, cryptographically signed certificates stored at their owner. The concrete architecture and implementation will be based on Eclipse Dataspace Components (EDC), in a connector architecture, consisting of dataspace service and connectors for each participant. The latter can connect to each other, to the Gaia-X Digital Clearing Houses to verify compliance, and to dataspace services. A minimal set of dataspace services will be included: a portal to provide user-friendly access, a federated catalog to allow participants to search and select datasets, a registration service to ease participant onboarding and a semantic hub to provide standardised data descriptions.

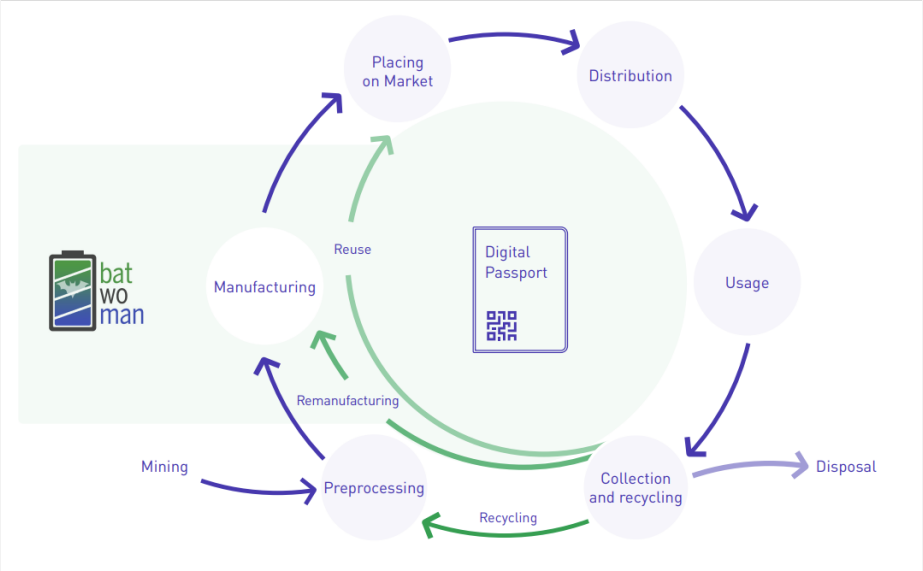
Maturity level and application sectors

Our system is demonstrated as part of battery production, but not in an operational environment pipeline, corresponding to Technology Readiness Level 6. We consider battery cells produced in a research project, which will not be placed on the market. Thus, we work with a reduced supply chain and emulate certain business role (e.g. retailer, authorities) and limit others (e.g. recycler, user). Our data will also be limited: only data from the battery cell production process will be generated as part of BatWoMan, complemented by external data from materials sourcing and estimated data on sustainability from the life cycle assessment. Data related to the usage phase, to the batteries' second life or even from assembled batteries past battery cells (e.g. modules or packs) are not directly included. However, data relevant to the recycling phase, complemented by recommendations on the recycling route, are included via the LCA.

Application sector: Batteries

Passport Architecture





Useful links:

Project website: https://batwoman.eu/

LinkedIn: https://www.linkedin.com/company/88912365/

Cordis: https://cordis.europa.eu/project/id/101069705

ERCIM News article: https://ercim-news.ercim.eu/en133/r-i/digital-battery-passports-for-a-circular-economy

BP

Battery Pass (BP)							
The Battery Pass Project is developing cross-industry content and technical guidelines for a digital battery passport according to EU Battery Regulation requirements and to demonstrate them in a pilot project.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		
	Traceability	Tagging (QR)			Others		
Unique technical aspects							
We consider the following technical aspects GAIA-X, NGSI-LD, SSI, comprehensive modular Standard Stack considering value chain, data processing and governance.							

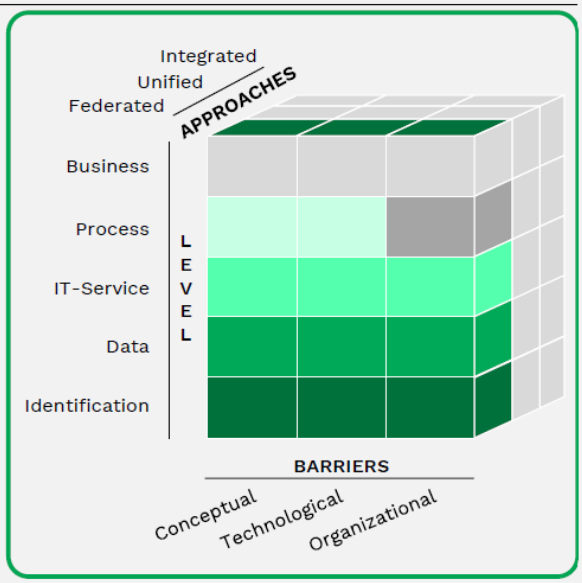
Maturity level and application sectors

Initially, the Battery Pass Project is scoping the automotive industry. But as discussed with stakeholders, most of the standard stack elements could be used for other products and sectors (e.g. GAIA-X specifications). The modularity of the standard stack architecture enables the exchange of sector specific aspects by not changing the entire architecture. As we are aiming to use existing standards for applying most adopted and mature standards.

Enterprise Interoperability Framework (ISO 11354)[1]

Level:

- Business: harmonisation at the level of organization (i.e., methods of work, legislations, culture, ...)
- Process: how to connect internal processes of two companies to create a common one
- IT-Service: Identifying and composing independently designed and developed IT-Services
- Data: interoperability of data to find and share information (i.e., different data models) from heterogeneous bases
- Identification: Unique identification of products, organisations and people along the value chain

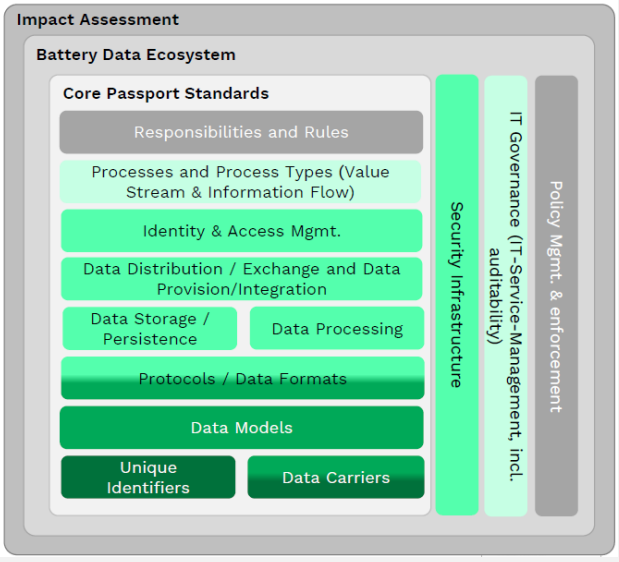


Barriers:

- Conceptual barriers: syntactic and semantic differences of information to be exchanged
- Technological barriers: incompatibility of IT to present, store, exchange, process and communicate data
- Organisational barriers: They relate to the definition of responsibility (who is responsible for what?) and authority (who is authorised to do what?)

1) Source: https://www.researchgate.net/publication/220921500_Enterprise_Interoperability_Framework

Technical Standard Stack

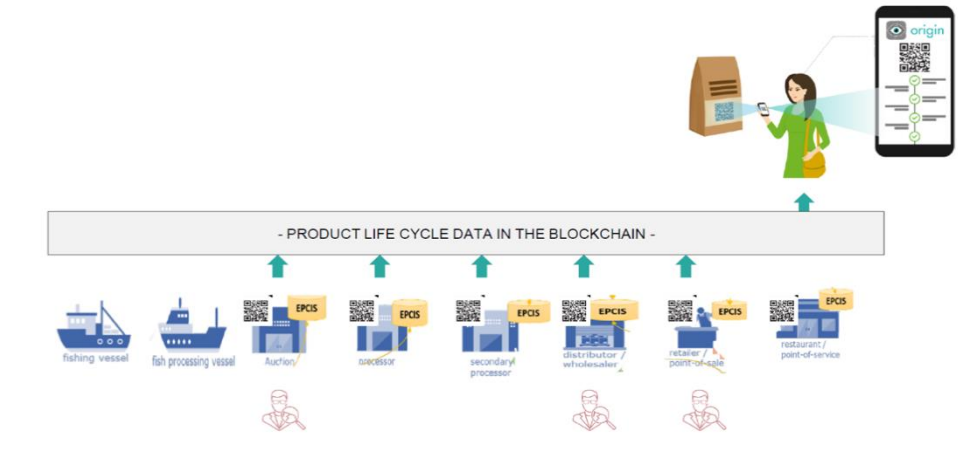


Worldline B-Traas

Blockchain Trace (B-TraaS)
B-TraaS for Blockchain Traceability as a Service is an open product to allow creation, management and operability of specific traceability chain related to a product value cycle where multiple actors would be involved. As an example, the solution could be used to trace the supply chain of Tuna fish from fishermen up to end consumer who acquire transformed tuna product in a shop. At each stage of the product life cycle, each actor will input information related to his operation to the traceability chain.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			
Unique technical aspects							

B-TraaS has been designed in a way that enables the quick and easy creation of a traceability chain based on blockchain technology. Through a web interface, an economic operator would be able in a few clicks to define his traceability chain, input product characteristics to be traced, involve relevant stakeholders and finally generate their own private Blockchain. Through mobile apps or connecting production machines via standardised API, all actors involved would be able to exchange data via their own traceability blockchain.



Maturity level and application sectors

The solution has been used in its first version under the brand “Origin” from bureau Veritas.

Useful link:

https://www.bureauveritas.fr/besoin/origin-la-solution-blockchain

CableDPPs - PULRPASS™ and HELIPASS™

CableDPPs - PULRPASS™ and HELIPASS™

PULRPASS™ and HELIPASS™ Cable DPPs from PULR Technologies Inc

Our Cable DPPs make it possible to add RFIDs onto cables in a way that is cost effective and allows use of any NFC app on a smart phone to locally read and optionally add to the DPP and make informed circular economy decisions. Our CableDPP's open the door to a limitless number of features and functionality from brand management to digital twinning. CableDPPs serve as a link to controlled information restricted on a public blockchain and made available for instance, only to specialized recycling agencies. Our CableDPPs are available on an OEM basis as a HeliPASS™ external to the cable sheath or as a PULRPASS™ below the cable sheath. Both have proven reliability including product lifetime data retention. We manufacture in Quebec, Canada using affordable renewable energy, with compostable material, automated production lines and QC. We are fully committed to the best CableDPP user experience for cable manufacturers, end-users, and recyclers alike.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

HeliPASS™ and PULRPASS™ can be easily modified to various cable diameters and are injection mouldable at high throughput including using compostable plastic resin. Multiple patents by PULR Technologies are combined. The first adds a flat surface to the round shape of a cable which otherwise impairs the performance of an RFID radiofrequency (RAIN, BLE, Wifi, UWB) or inductive (NFC) antenna. The second isolates RFID antennas from the metal inside cables to significantly improve the quality of the user experience interacting with the CableDPP RFID. The third provides a proprietary method of attachment to the cable in a way that is re-usable without need for zip ties. Embracing the spirit of survivability, our CableDPPs can store an irrefutable digital twin link into a public blockchain to which the local circular economy legislator is participatory. We work with our OEM customers to establish CableDPP functionality in terms of RFID technologies, reading distance, memory size and security.

Maturity level and application sectors

HeliPASS™ and PULRPASS™ CableDPPs are available as commercial products. We are actively working with global product manufacturers, retailers, and recyclers to define what information to store inside the DPPs and into the public blockchain. PULR Technologies Inc. aims to be a facilitator, contributing its expertise and hosted infrastructure to the extent the infrastructure is not already in place. The geometry of the CableDPPs from PULR Technologies Inc., are equally applicable to other use cases such as garden hoses and climbing ropes, just to name a few. We embrace the concept of DPPs for industrial use cases including digital twins of cabling and conduit infrastructures for improving preventive maintenance in properties management, construction, telecom network, data centers, cybersecurity, electrical networks, water management and HVAC. We can contribute our significant expertise to the establishment of DPPs for other needs such as food security and retail products.

Useful link:

sales@pulrtechnologies.com

Charming. Digi

Charming.Digi
/CHARMING.DIGI operates as a SaaS platform, allowing brands and retailers to deliver DPP, critical product information, marketing content and engaging experiences to consumers. With an option to link to our garment trims web order system GS-1 Datalink digital IDs are proactively created and applied to garments at source, through QR, NFC or any other suitable carrier. The primary key of GTIN/PO# is preloaded to Charming.Digi before the items hit the retailer, allowing supply chain and textile product data from third party systems to be associated with the product page. DPP data and digital assets can be manually loaded, uploaded or near real time through REST API. Utilising data attributes to present the appropriate data and digital assets for the product scanned. /CHARMING.DIGI offers a unique consumer experience, whilst engaging the consumer in DPP.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
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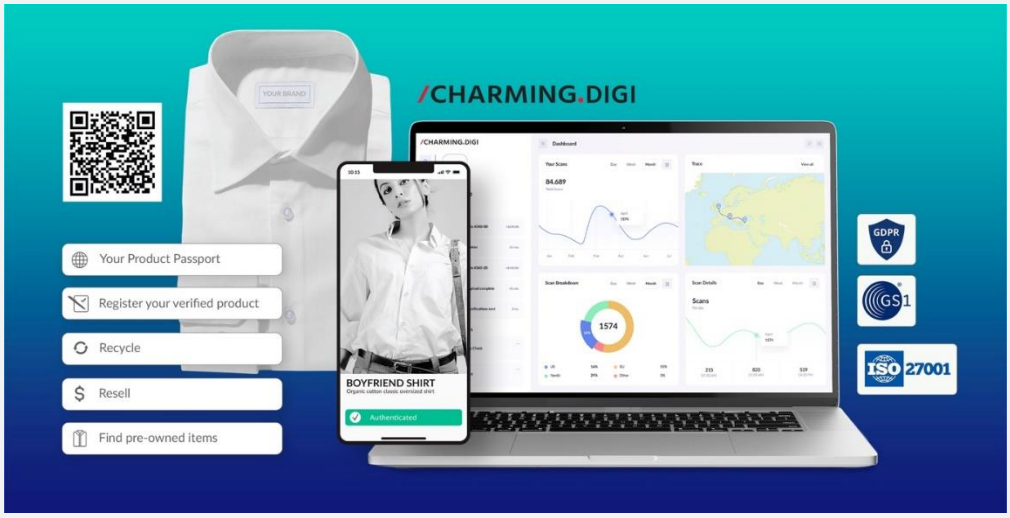
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Whilst the primary function of /CHARMING.DIGI is to present DPP data to consumer, it offers brands and retailers a new way to engage with their consumers with functionality such as:

- Product to consumer registration
- Product Authenticity
- Direct Links to resale and recycling platforms
- Track the post-sale lifecycle of the textile
- Digital Care Labels
- Ability to present variable digital assets such as product information, marketing literature based upon data attributes of the product scanned
- Collect feedback from consumers and survey new designs
- Link consumer activity on the platform directly to your CRM

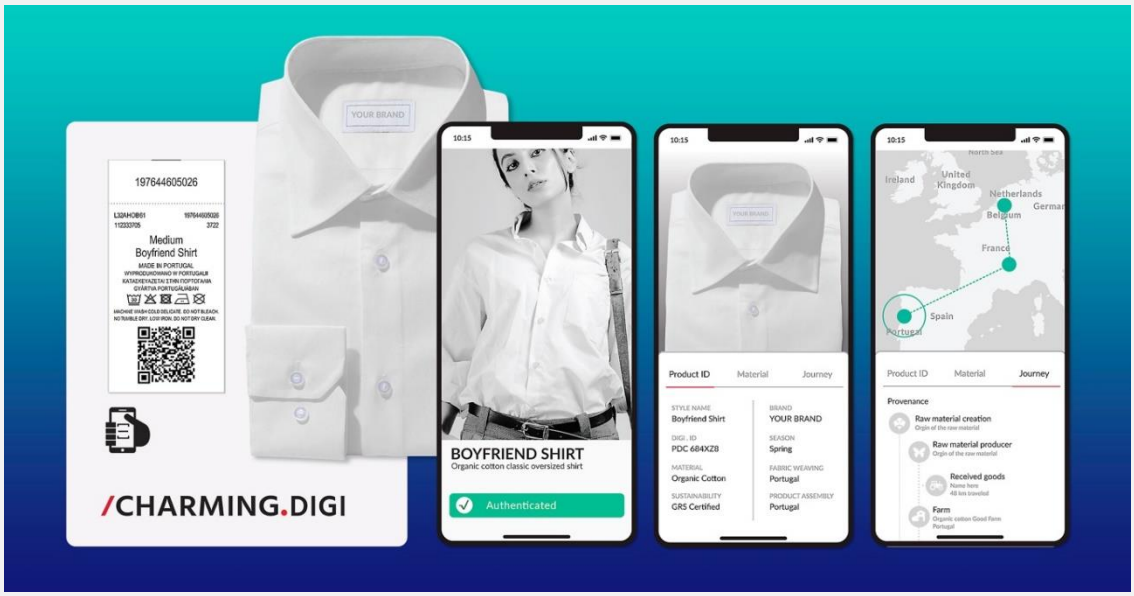
All the above are configured in the Passport Builder user interface, Product Cloud hosts the data to which the Passport is linked and the Experience Centre engages the consumer.



Maturity level and application sectors

Our solution has maturity level "Defined". We are running Pilots with promising results that support real-world (business) cases. Our implementation process is mature and we have a standardized project approach.


/CHARMING.DIGI
JUST 4 EASY STEPS
1
UPLOAD YOUR PRODUCT INFO
2
CHOOSE QR CODE / NFC
3
BUILD YOUR PRODUCT PASSPORT
4
ACCES CUSTOMER INSIGHT
NFC
Product Passport
General
Material
Journey


197644605026
Medium
Boyfriend Shirt
/CHARMING.DIGI
BOYFRIEND SHIRT
Organic cotton classic oversized shirt
Authenticated
Product ID
Material
Journey

Checkpoint DPP Carrier Labeling Solutions

Checkpoint DPP Carrier Labeling Solutions

Checkpoint Apparel Labeling Solutions (ALS) is a global branding and labeling partner for retailers, brand owners, and manufacturers. We're with you from the creative concept stage to the finished garment.

With extensive knowledge of labeling requirements and variable data handling for global brands, Checkpoint supports you in all your labeling and data carrier requirements ready for the Digital Product Passport.

With printed and woven textile options, including our GEMINI TAG® RFID or NFC embedded intelligent pocket labels, we have the solution for you.

We pride ourselves on being completely data agnostic, so you can choose the data storage provider that works best for you which is seamlessly integrated via our CheckNet® platform to allow a completely transparent and user-friendly label ordering process.

Our vast portfolio of labeling options provides brands with the full package they need to support their sustainability goals while remaining compliant with international regulations.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
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Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Our full-package labelling options are all supported and facilitated by our in-house platforms, CheckNet® and CheckProof®. By designing and maintaining these platforms ourselves, we're able to provide excellent service and have your labels designed, approved, and produced faster than ever.

We design and manufacture all our RFID inlays and labels. This allows us to ensure they are each fit for purpose and only deliver labels that pass our stringent QA checks and processes, as, unlike others, we are not dependent on third parties for anything other than the chips.

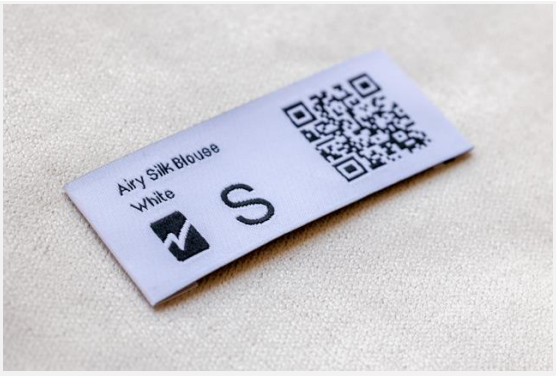
CheckNet works as a data-agnostic platform, allowing us to integrate with any data provider through a secure and robust API connection, giving complete flexibility to the customer, without compromising on security or performance.

Maturity level and application sectors

Our labeling solutions and products are used by some of the world's largest fashion brands, alongside companies across various other sectors, including logistics, pharma, airlines, grocery, and fast-food outlets.

We don't believe in a one-size-fits-all all solution, so all of our relationships and offerings are unique to each company we work with, to ensure we meet their needs and requirements from the outset. With one of the broadest portfolios of RFID inlays available, all designed and manufactured in-house, our intelligent labeling solutions offer brands and retailers the opportunity to gain enhanced visibility on their products like they never had before.

Our options for DPP carriers and labeling are already in use by multi-national retailers. An example of this is our successful partnership with a well-known data platform provider in delivering multi-format labels, each with unique and traceable identifiers.



Useful link:

Apparel Labelling Solutions - Checkpoint Systems UK - Retail Technology Solutions

Circlolink DIGITAL PRODUCT PASSPORT via RFiD THREADS®

Circlolink DIGITAL PRODUCT PASSPORT via RFiD THREADS®

Circlolink digitized platform connected to RFiD THREADS® DPP link products to a circular economy through a single 10cm metal thread. Is the world's 1st washable smart ID tool able to stay with products for the entire lifecycle then recovered, reused or recycled. Bulk scannable plus collects new open-source continuous data in real-time on usability, durability and longevity.

Affordable UHF Readers offer omni-channel SCM solutions, efficient returns, plus connects to IoT & interconnected network of “R” resource recovery providers to increase brands ROI. Document circular design mitigation strategies, repairs, rent, resale, redesign & remake before recycling.

Assists R industries, Certification, Standardization, reporting & compliance with transparency, traceability, unfakeable authentication, sorting plus re-distribution for safer feed stock formulas. Matching QR Code for customer engagement & education.

Circlolink combines human centered design with smart tech to connect all “C” stakeholders; charities, communities, councils, companies & countries. Bulk 100m manufacturing offers fast rollout at the same equitable price to engage all stakeholders.

Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others	
	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
	If advanced	Attribute based		Role based		
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others
	Convenience	Wallet		Data Ports		Others

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

- Data capture is per product
- Initial connection to SCM at manufacturing stage is locked & confidential. Customers request when to 'unlock' ie collapse software link & become open source. Show only agreed data
- Data instantly revealed & verifiable. Published by brands e.g. Certification, Standards, REACH, ISO etc
- Connects to brands' own LCA software or open source metrics analysis e.g. "waste" mitigation from circular design e.g. 3D sampling & product longevity/final location Evidence is not in landfill, incineration, or offshore without verifiable redirected contracts for compliance
- Facilitates bulk sorting & adds new data by providers e.g. for repair, resale, rent
- Brand partnerships increase ROI per product based on repairability, durability, longevity
- Increase product return efficiency, scan, enter passcode & digitally reconnect to SCM
- Authentication unable to be faked like QR Code
- Resellers increased efficiency accessing time consuming provenance, size, and measurement data
- Resellers e.g. ebay can validate 'Shops' for sellers & buyers to take products to be read and authenticated for a fee
- Matching QR code to read data w/outUHF RFID Reader
- Options; non-washable, 30 washes/cleaning, 60 washes/cleaning
- Pliable to insert into new & used
- Withstand washing, drying, and tumbling at -35 C to 200
- Reads 1cm to 5m and 100s of products instantly

  Uses <1% of metal compared to existing tags saving 12.5 billion units to landfill peryear
- Size advantage & capacity to hold information
- Only digital solution able to be hidden
- Link to valorize and automate using AI, advanced manufacturing & robotics

Maturity level and application sectors

Adetex.ID parent Co. conducted pilots with Tommy Hilfiger, Ralph Lauren, Decathlon, Marks & Spencers, etc and were awarded the H&M Global Change Award for RFiD THREADS®.

By connecting to Circlolink app cloud platform & providing open source access we aim to facilitate the inclusion of all 3 CE principles & provide at-scale, inclusive circularity generating unprecedented data to offer metrics for change.

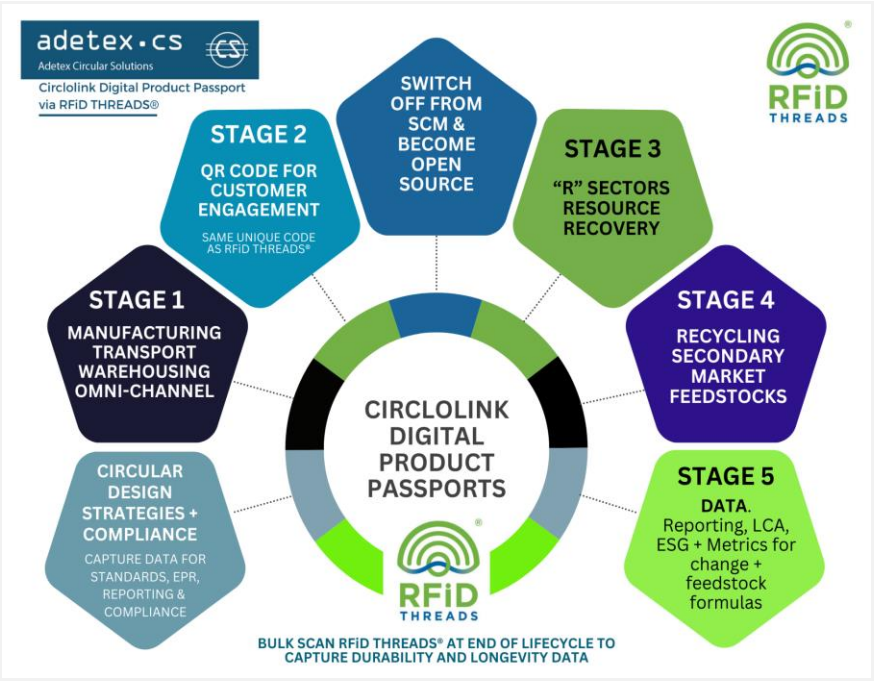
Adetex.CS currently offer Starter Packs of 100 RFiD THREADS® with a Chainway C72 reader.

Also, offer large-scale collaboration to governments & consortiums to underwrite a 100m bulk production (with 100% financial return) & fast-track rollout to stakeholders of all sizes. At an equitable low MOQ price we engage all industries from NFP second-hand charities, to rental & repair plus student designers to SMEs and multinational brands, who all purchase DPPs at the same price plus connect to the app for free for 2 years and free connection to resource recovery sector.

Enables multi-industry interlinks e.g. clothing & uniforms, footwear & accessories, homewares, healthcare products, mattresses, tires.

Access for council landfill mitigation, reduction in “waste” costs, and quantifiable savings.

Adetex.CS can commence manufacturing immediately in various locations worldwide and open to link to other platforms that require physical RFID tools.



Useful links:

https://www.circlolink.com/

https://www.rfidjournal.com/rfid-thread-provides-discreet-nonremovable-garment-tracking

Circular Concierge

Circular Concierge
CICON (short for Circular Concierge) is a post-consumer services marketplace, which connects garments to the right care products, cleaners, repairers, renters, resellers, charities and recyclers based on the garments' category, location, price, materials and care instructions. CICON uses its proprietary Life Cycle Analysis (LCA) model to calculate CO2 and water of the garment manufacturing, as well as generate primary impact data during the use stage of the garments. Use stage data is collected by facilitating purchase of local care products, cleaning, repairing, lending, and reselling. End of life data is generated when garment owners book its donation or recycling. Users can register garments manually or via a QR code, which is deep linked to our database of customers' products. CICON infrastructure currently set up in the UK and Australia.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

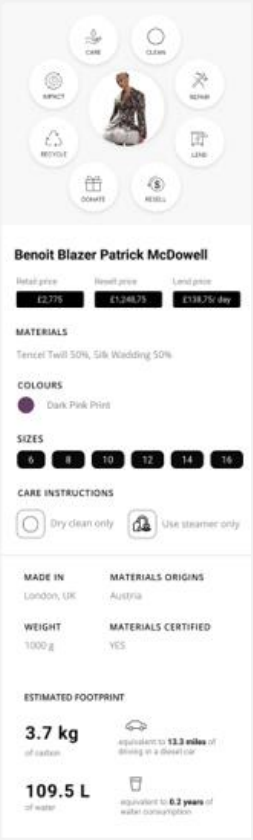
In addition to the required label, manufacturing and impact data, CICON adds to the DPP:

1. Prices: retail price, estimated resale price, and lending price for luxury items.
2. Linking to CICON app, which stores the item in the owner's personal wardrobe. There is an option to add a purchase receipt as well.
3. The wardrobe then matches the garment to the right care products, cleaners, repairers, resellers, lenders, charities, and recyclers based on: location, price, materials, and care instruction. From 2025, the matching will be available instantly through the DPP without the need to prior download the app and register the garment.
4. Brand, which makes the garment, is paid a commission on every recommended care product, dry clean, repair, lending, and resell, as well as collects data on donations and recycling shipments booked via this DPP.
5. Applied and tested DPPs are available on an SKU level. There is an option to create a unique DPP for individual garments.

Maturity level and application sectors

CICON has been piloted in Australia with 6 local luxury brands, and in the UK with 1 local brand. For example, below is the graphic representation of Patrick McDowell DPP for their SS24 collection presented at London Fashion Week.

Click for partnership page Click or scan the passport Click to deep link to the app



Circular.fashion

Circular.fashion
Circular.fashion is a sustainable change agency creating software and system innovation for a circular economy in fashion and textiles. Their DPP initiative, the circularity.ID® is a digital platform containing product transparency information, along with essential material data, to enable a holistic circular system. The objectives are to provide data to facilitate circular business models such as resale, rental and recycling at end-of-life and meanwhile increasing transparency of sustainability efforts and empowering customers. The system is built on the circularity.ID® Open Data Standard which has been developed to power circular practices and ensure longevity and recyclability, taking into account insights and requirements for making a product circular from material to design, use and sorting. Data stored in the system can be reached using circularity.ID® data carriers that are attached to the garments and contain a URL for consumers and a machine-readable identifier.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

- Interface for augmented sorting stations.
- Data carriers selected based on on-site tests with sorting facilities.
- circularity.ID Open Data Standard based on extensive research with recyclers, sorters, re-commerce/retailers, repair organisations and producers.
- Data standard is used or intended to be used from five other platforms.
- It allows machine-readable data exchange via API between different systems and stakeholders.
- Platform is built to work with various product identifiers such as GTIN and organisation/location identifiers such as OAR, GLN.

Maturity level and application sectors

The circularity.ID system has been in use with several fashion brands since 2019. The circularity.ID Open Data Standard has been constantly further developed. In 2023 version 4.0 will be launched. Currently, the standard and the circularity.ID system is built for apparel. It could be easily expanded to cover other similar product types. Several textile sorting companies are already equipped with sorting stations to work with the data from a circularity.ID. The sorting stations can be easily expanded to other product passports once they are standardised.

Useful links:

https://circular.fashion/en/

https://circularity.id

https://circularity.id/open-data-standard.html

Circularise / SaaS

Circularise / SaaS						
Circularise / SaaS (Software as a Service) solution using Blockchain and Cryptography to enable traceability in supply chains.						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others	
	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
	If advanced	Attribute based		Role based		
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		
	Traceability	Tagging (QR)		Others		
Unique technical aspects						
The Smart Questioning makes it possible for all companies to cooperate in a trusted information exchange. In the system, companies are anonymous, and remain the only owner of the data. They decide how much information is shared and with whom and are able to validate the answers to any question without sharing the original data. Circularise's technology allows for companies to						

communicate about the data of their products and for anyone to scan the QR-Code on the product in order to see the product information or ask a Smart Question to the decentralised store of the full bill of material reaching back to the mining stage. The anonymity and control of the amount of data shared at any moment is the only way to get all companies to cooperate and thereby overcome the issues with centralised databases that are rejected due to the risk to confidential business data.

Maturity level and application sectors

Circularise technologies allow communication on data instead of simply the data. In supply chains we often deal with data that needs to remain a secret. All normal encryption methods can be decrypted over time. We use an implementation of zero-knowledge proof (ZKP), a technology we call “Smart Questioning” that allows stakeholders to ask critical questions (e.g. "Does this plastic part contain material “x”?") to a guarded dataset of private information (e.g. the bill of materials). Practically speaking, the user sees the reference on Blockchain (hash) and by asking questions to this hash, the question is sent to every locally stored dataset of every supply chain stage. Practically speaking, it is the "interrogation" of the entirety of the supply chain of a product by asking a list of specific questions to a QR-Code or hash. As the private information is audited, so is the output.

Useful link:

www.circularise.com

Circulor

Circulor
Circulor is a technology company that specializes in supply chain traceability and sustainability. The Circulor platform uses a combination of blockchain, AI and other advanced technologies to track and verify the origins and movements of raw materials, components and finished products through complex supply chains. Blockchain is used to create a tamper-evident digital record that is attached to each item which allows the collection of primary data from the upstream value chain for reliable and proven ESG metrics that can be connected into our DPP solution. It further tracks materials and products across lifecycle stages, connecting with carbon footprint, due diligence, and recycled content data from our platform with additional data on performance, durability, and safety from other backend-systems. Circulor is further engaged in industry initiatives like CATENA-X, GBA and DPP related research projects like the German Battery Pass project to ensure maximum alignment with current developments.

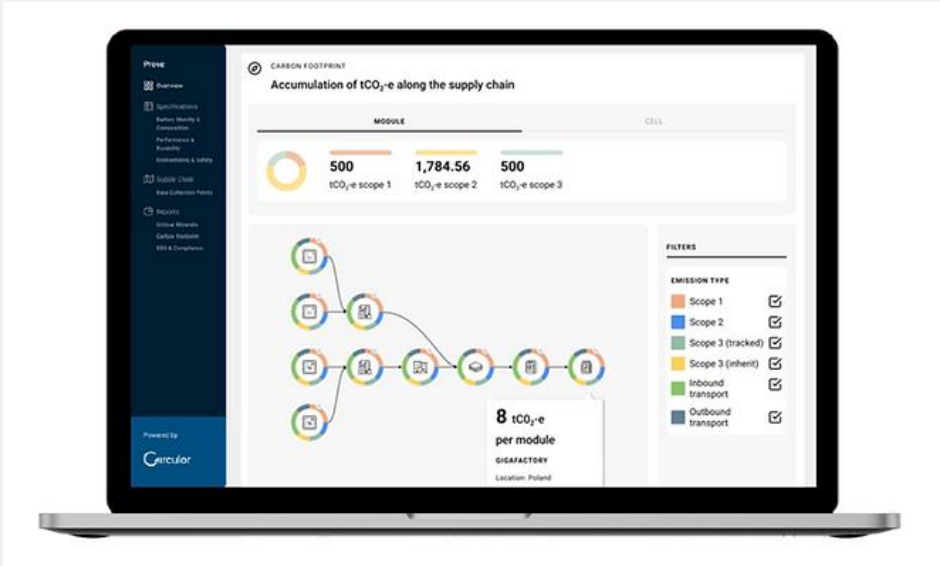
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

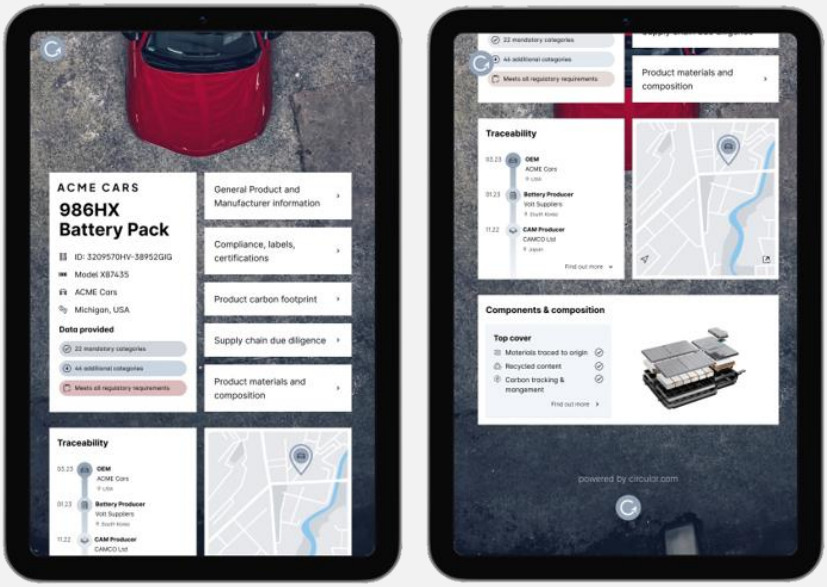
A DPP is often misperceived as a traceability tool for the upstream value chain. In fact, a DPP is just issued when the corresponding product enters the market. However, many required DPP data attributes like actual material composition, recycled content, CO2 emissions and supply chain due diligence information must be gathered from the upstream value chain. Hence a connection between DPP solution with a traceability solution is desirable and one of the unique technical aspects of the Circulor platform. As integrated blockchain solution, an enterprise-grade blockchain platform that provides high levels of scalability, security, and performance is used. For performance reasons, only a digital fingerprint of the digital records is managed in the blockchain. Reliability of data is ensured by configuring business logic to check data consistency (e.g., mass balance, geo location, etc.) and identifying anomalies when data is not in line with expectation and notifying users.

Maturity level and application sectors

Circulor was founded in 2017 with many successful industry and research projects already complete. Today, Circulor's supply chain traceability platform is considered one the most complete and mature solution on the market, offering a solution for any type of product or commodity. Because of that big consulting companies like Deloitte and KPMG build strategic partnerships with Circulor already which underlines the maturity level. However, a strong focus is currently on DPPs for batteries due to upcoming regulations and the amount of value share in the value stream of electric vehicle batteries. The Circulor DPP solution helps companies to comply with upcoming regulations like the EU Battery Regulation and EU Eco-design for Sustainable Products Regulation (ESPR). Although not all the details in the EU Battery Regulation are finalised yet, the data content requirements and the envisaged distributed management of data are mature, meaning industry can prepare for when the first battery passport must be available beginning of 2027.



Circulor's PROVE platform and carbon emissions dashboard, showing the breakdown of Scope 1, 2 and 3 from upstream emissions based on the flow of materials for a battery module.



Circulor DPP solution

Useful links:

Overview on Circulor's DPP solution: Circulor DPP solution

DPP connected Circulor traceability solution: Circulor Traceability solution

CircThread

CircThread
CircThread is a H2020 EU-funded project (2021 – 2025) with the objective to unlock access to product data for circular economy purposes. The main target is to facilitate information flow exchanges across the extended product life cycle from the product as manufactured to retailers, consumers, repairers, collectors, pre-treatment operators and recyclers, as a Circular Digital Thread using Digital Product Passports. The information can vary from data consisting of product characteristics, product components, their materials and chemicals data, and related circularity, environmental, social, and economic information. This data will be captured, linked, and shared on a cloud-based, collaborative ecosystem with a software platform and a linked circular data space with a core set of open-source modules, to allow all actors throughout the product life cycle to share the necessary information. To ensure that more materials and products stay in the economic loop, benefitting the sustainability of the economy and the environment and reducing carbon emissions.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling		Enforcement		Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

The CircThread Ecosystem will enable the following:

- The registration and validation of organisations and their users based on their roles across the life cycle of products.
- The central registration of product models, which form the basis of a model in a company's line of devices or appliances.
- The generation of Digital Product Passports for individual products under a product model. Based on a linkage between the product model, the product serial number that allows individual identification of a product, a QR code for the digital-physical linkage with resolver to the digital product information.
- The generation of product meta-data catalogues at the product model level to enable a registry of potentially available information for exchange at decentralized databases from the data provider.
- The exchange of documents referenced in a product meta-data catalogue based on the International Data Spaces reference model and associated IT infrastructure.
- The decentralized linking of software services to the data space, also referred to as external data apps, which can connect to the information exchange system, so as to process product information.

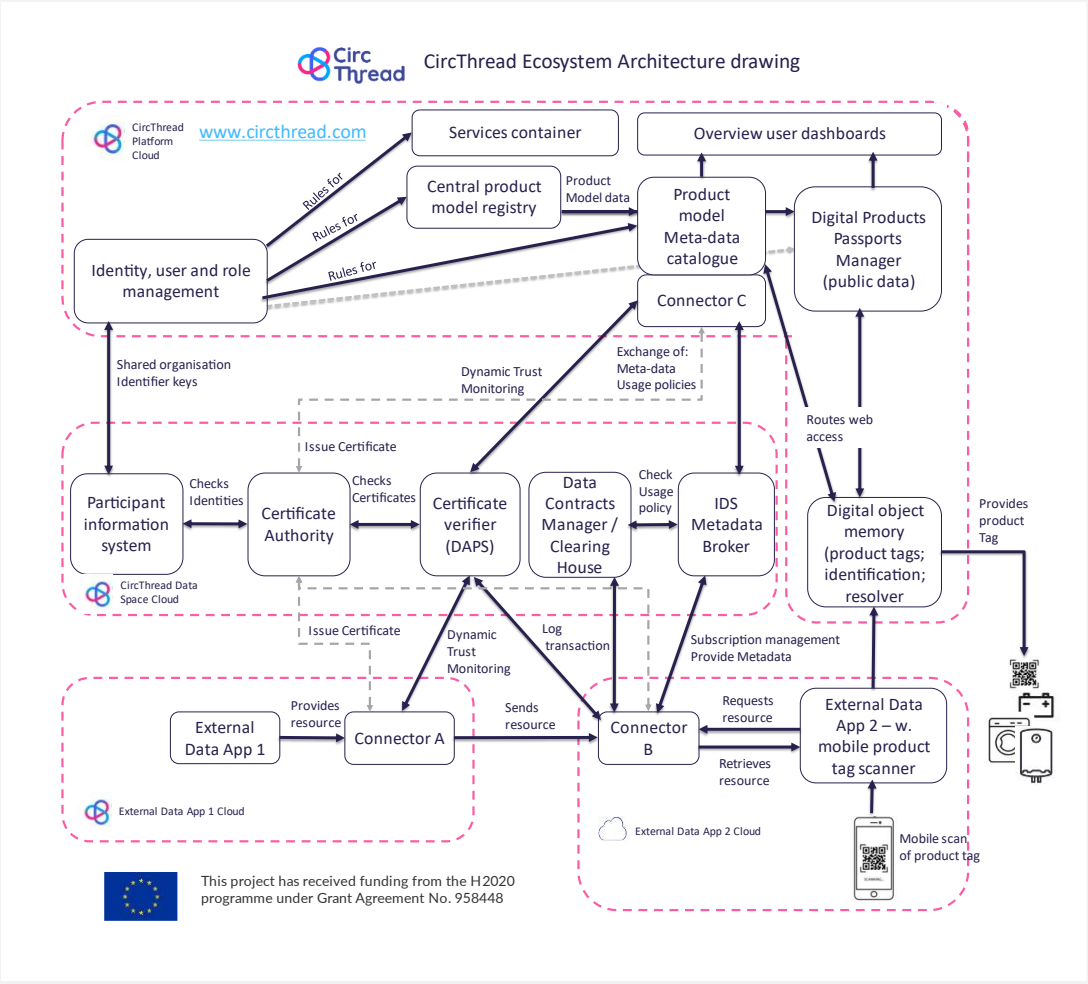
Maturity level and application sectors

Pilots: batteries; boilers; solar photovoltaic glass; washing machines; dishwashers.

Services: 14 product life cycle information exchange and management services at TRL 4 to 5 at start of the project.

Platform: first prototype under development

Dataspace: first prototype under development using IDSA test-bed & Fraunhofer connector.



Useful links:

CircThread IT architecture diagram: www.circthread.com

T5.1 report – CircThread architecture overview and schematics:

https://circthread.com/download/deliverable-5-1-architecture-overview-and-schematics/

COSMILE-APP, health&media

COSMILE-APP, health&media
The App offers a European-wide solution for information and identification of cosmetic products (e-labelling). The information on cosmetic ingredients is uploaded by the manufacturer which ensures a reliable source. The product identification is flexible - currently handled via GTIN or QR-code. The COSMILE-App is available in 8 languages, further are in progress. It is based on the European-wide ingredient database, the COSMILE-Europe database, published by the European Cosmetics Association Cosmetics Europe. All information on cosmetics, their ingredients and other information are uploaded by manufacturers, Further enlargements are in progress, e.g. on packaging materials. The application is available since 2018, is permanently upgraded and a solution for digital labelling of cosmetic products.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
T architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

The COSMILE-App is implemented in Flutter, an emerging framework by Google for app development on both iOS and Android. This allows us to serve both mobile ecosystems with a single code base, improving the user experience everywhere. The product data for the app is prepared in the backend, which receives product information from manufacturers. Data transfer from the manufacturer is realized via Atrify or proprietary methods in Excel or CSV format. During this preparation, ingredient information is validated and corrected through a semi-automatic process, providing a valuable service to manufacturers while simultaneously linking further INCI information to products.

The app primarily uses a barcode (or QR) scanner to recognize products. If products are not covered by our product database, the ingredient information on the packaging can be analyzed using Optical Character Recognition (OCR, text-recognition), and matching INCI information from the Europe-wide database can be provided.

Maturity level and application sectors

The website haut.de is a central communication platform for various interest groups about “cosmetics” in Germany since 2005. The INCI database (ingredients in cosmetics) has been available on this website since 2006, is constantly updated and today comprises around 30,000 individual substances. The first INCI app (text input) was available for iOS and Android since 2016, the successor COSMILE app, extended by the barcode scanner, was launched in Germany in October 2018, shortly thereafter also in Austria and Switzerland. This was followed by the bilingual version of the app: April 2021 (English/German) and the addition of the OCR-INCI reader, the expansion to include Polish in November 2022 and Romanian, Hungarian, Spanish, French in February 2023. The app, which is available throughout Europe, is constantly updated in terms of content and technology. The product database currently comprises 60,000 products, and the app has recorded around 70,000 downloads to date.

Useful link:

www.cosmile.app

Countermak

Countermark

Countermark is a new type of data carrier specifically designed to attach data to fast moving consumer goods. It is based on human readable characters and is optimised for printing using Continuous Ink Jet Print (CIJP) - today's standard way of putting data onto consumer products.

Countermarks can be read using the Countermark App (on iOS and Android) or by industrial conveyor-based cameras. The Countermark servers are hosted on the Microsoft Cloud. Countermark data is protected by Ethereum blockchain.

The Countermark system features:

- API interfaces to create and read Countermarks
- Multi level information for public and private access to hosted data
- Ability to terminate or expire used Countermarks on product deconstruction
- Possibility to identify individual brand owner of a Countermark, enabling directed data enquiries to appropriate servers

More information at Countermark.com

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

1. Countermark is human and machine readable, human readability is enhanced with four separate fonts:
    a. Latin (Western Europe, Americas, Oceania, Africa)
    b. Cyrillic (Easten Europe, Russia, some former Soviet states)
    c. Katakana (Japan)
    d. Chinese (China and Taiwan)
2. Human readable is important for several reasons
    a. Countermark codes can be incorporated into invoices and delivery notes, so that traceability exercises can be done without the physical goods
    b. Damaged codes can be read manually if machine reading does not work
3. Can be printed with Continuous Ink Jet Printers (CIJP), these printers are used as standard throughout food and product manufacturing, codes can be printed with minimal changes to existing production lines.
4. Can be printed with Laser printers, these are gradually displacing CIJP machines
5. Countermark is available in open or encrypted formats
6. Countermark app uses remote reading (on our servers) which allows data enquiries to be decentralised

Maturity level and application sectors

Countermark is based on the world's largest, most extensive and oldest traceability system - that used for letter processing.

Wessex was part of the team that pioneered the use of so called 4-sate codes on letters with Royal Mail in the early 1990's.

Royal Mail has been printing approximately 120 million 4-state codes every 24 hours and reading 480 million codes over the same time period. Subsequently the style of code pioneered by Wessex and Royal Mail has been adopted by many other mail administrations.

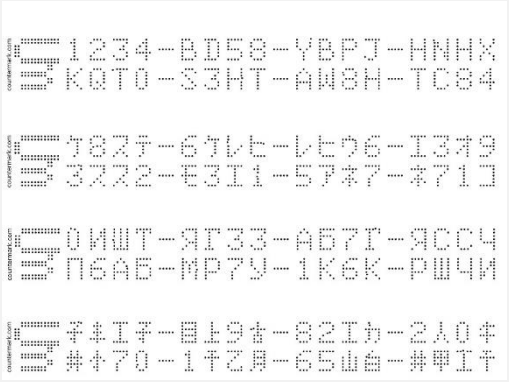
When Royal Mail introduced 4-State codes, letter mail was the predominant method of business communication and payment via cheques, requiring ultimately reliability and dependability.

Countermark and the technology that underpins it, is a direct descendent of these codes.

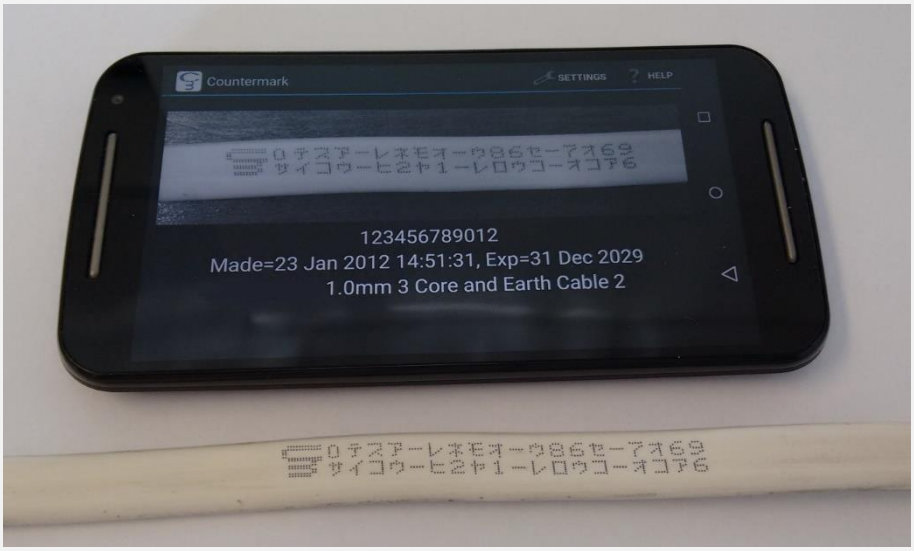
Since 2020 Countermark has been in daily use protecting ISO9000 certificates.

In this use-case the Countermark is added to the PDF on the certificate. The certificate is validated when scanned by the App.

Countermarks in Latin, Katakana, Cyrillic and Chinese



Countermark on electrical cable



Countermark garment label – clearly based on Royal Mail 4-state codes

Useful link:

https://countermark.com/

CREDZ

CREDZ

CREDZ provides a scannable "Trustmark," only available to quality manufacturers, to verify and identify the credentials and legality of any battery, LEV, or key component.

CREDZ uses world-leading Laava ID images to verify immutable production records to the serial number level. Using Laava's patented digital ID, AI technology, and computer vision, CREDZ determines regulatory compliance and connects customers with brands.

CREDZ ID represents "digital twins" of any battery, device, or component, enabling digital proof of ownership and other services while allowing manufacturers to support owners for the life of their devices.

CREDZ ID allows instant identification and verification of batteries, bikes, scooters, and other LEVs. Scans authenticate credentials and compliance with international standards and local regulations and can advise owners of local laws.

Proving products' authenticity and compliance improves safety and reduces the risk of lithium-ion battery fires caused by non-compliant components.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials	Others			

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Laava has patented digital ID and AI technology, originally developed with Australia's Government Science organisation, the CSIRO.

Each Laava ID is a secure web-verified digital fingerprint.

- AI-powered computer-vision tech captures an image of every scan.
- Every scan is tracked globally: date, time, location and more.
- Only available to brand owners and partners (unlike QR/NFC).

Fast, easy, and cost-effective to deploy at a global scale.

- Implemented using conventional digital printing technology.
- Fully brandable and white labelable; supports GS1 standards.
- No App needed – scan via the brand website, WhatsApp, WeChat, Facebook, and camera – via Laava Smart QR™. GDPR compliant.
- Partners and integrates with traceability, IoT, ERP & digital platforms.

Maturity level and application sectors

CREDZ's underlying core technology is licensed from Laava, which was formed in 2017 and launched in 2019. CREDZ is Laava's channel partner for micromobility—LEVs and related components such as lithium-ion batteries. This sector is new to Laava, and CREDZ's expertise has been in consulting in new mobility since 2014 through our services brand, Zipidi.

The core Laava technology has been deployed with over 90 customers who are multi-year repeat clients. Over 10 million items, including consumer products, food and beverage, health and wellness, auto products, documents, and more, have Laava digital fingerprints.

The product is proven and mature and continues to develop new market-leading low-cost security features.

CREDZ

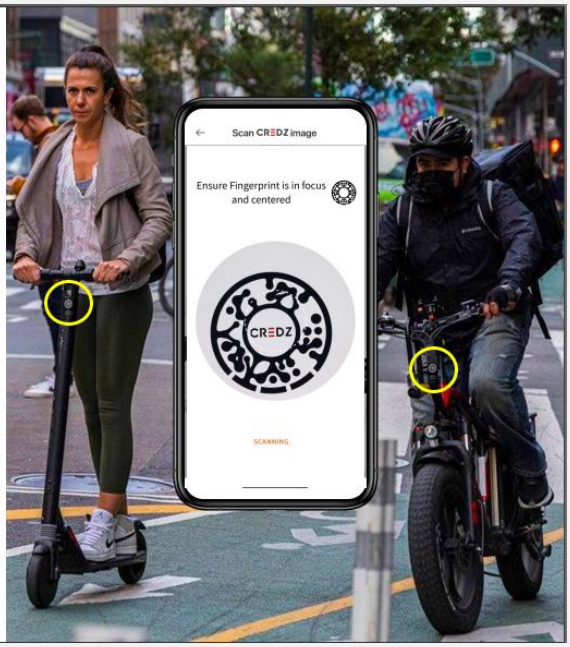
Scan – Verify - Connect

CREDZ are scannable, randomly generated images - not codes - unique per item using advanced computer vision technology. This makes CREDZ secure, cost-effective and very easy to deploy.

Linked to blockchain metadata, CREDZ provides access to secure applications for manufacturers, retailers, owners, service providers, and government.

- Each device is identifiable at the serial number level
- Scan to register the warranty
- CREDZ acts as a customer service concierge
- Verifiable as a compliant device for its country, state or city
- Able to provide a range of instant services to users, logbook service records, proof of ownership, rewards, loyalty and more

For a simple CREDZ example, scan the code on this slide on a mobile phone at www.credzid.com/scan



CREDZ - The Problems Solved

CREDZ enables vehicle credentials to be verified instantly, connected to customers and securely shared with service providers

Trusted Vehicle Credentials (and/or Batteries)

- CREDZ are secure digital twins of vehicles, right down to the serial number level, linked to immutable production records of models and their specifications.
- CREDZ authenticates if a device meets the regulatory requirements of the Country, State and/or City within which it is located.
- Specifications are shared with users with local riding regulations.

Connecting Customers with Vehicles

- CREDZ can be used to record a warranty and ensure manufacturers, retailers, and distributors have customer information.
- Rewards and loyalty programs can be linked to registered vehicles providing customers with richer and more rewarding brand experiences.
- Enable proof-of-ownership, change of ownership and individual-specific notifications.

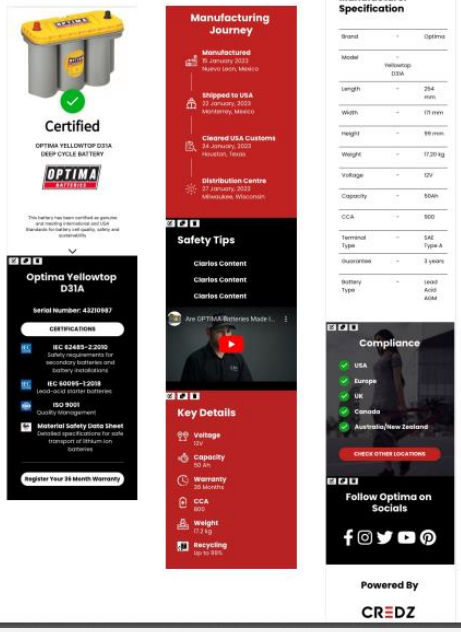
Sharing Verified Details for Services

- Instantly share authenticated customer information and vehicle specifications with trusted service providers.
- CREDZ digital logbooks to keep track of the life history of any vehicle and its core components.
- Instantly share authenticated vehicle specifications with insurers for instant cover.

Scan

at www.credzid.com/scan

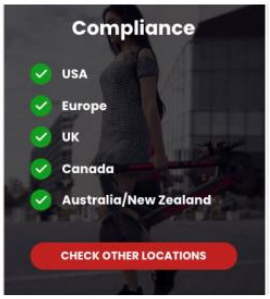
- Scan the fingerprint on any battery to verify its credentials and compliance with regulations.
- CREDZ fingerprints are secure and unique. They are linked to tamperproof production records.
- Templates can vary for battery types, locations and brands.



Verify

CREDZ verifies battery information against regulations for any country, region, state or city using customers' locations

- Product Journey
- Materials used
- Manufacture date
- Compliance with any regulations
- Batch or Serial Number of battery
- Date of sale
- Retailer/ Partner who sold the battery
- Name of the person who purchased the battery
- Name of person or retailer who activated CREDZ warranty
- Location where warranty was activated
- Battery health information if BMS enabled



Cyclance

CYCLANCE							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			
Unique technical aspects							
The EECC DPP's uses GS1 Standards (EPCIS with EECC's EPCIS "EPCAT", Digital Link, Resolver,…)							
Maturity level and application sectors							
Application Sectors:							

Fresh Food, Textile, Plastic Packaging, Electronics Industry, and Battery

- Packaging: DPPs are ready for Packaging at R-Cycle where we won the sustainability award https://packagingeurope.com/news/winners-of-the-sustainability-awards-2022-announced/8680.article, we use all relevant plastic producing parameters focusing on Recyclability.
- Battery: DPP demonstrator is ready using producing events for producing battery anodes within a Fraunhofer Initiative, focusing on CO2 and water footprint.
- Textile: DPP will be demonstrable with the consent of C&A with original 100Mio+ events
- Food: DPP adoption out of METROs PIER (ProTrace Inhouse EPCIS Repository powered by EPCAT), running for 7 years.
- Electro/Industry: DPP adoption demonstrator with real data for Schaeffler is ready.

Cycle Platform

Cycle Platform
Cycle is the first ever transversal platform to join the textile industry's prime and secondary markets by following a product along its entire lifecycle. Cycle integrates two solutions: **Cycle Platform**, the front-end e-commerce platform that pioneers a novel consumer purchase/repurchase model, and **Cycle Data Platform,** the back-end technological platform dedicated to aiding the fashion industry in the individualized identification of each garment along the entire product lifecycle, following the ESPR regulation guidelines. **Cycle Platform** provides crucial data that facilitates circular business models like resale, rental, and recycling at end-of-life, simultaneously enhancing transparency in sustainability efforts and empowering customers. Moreover, the platform facilitates the exchange of information across the extended product lifecycle, connecting manufacturers, retailers, consumers, repairers, collectors, pre-treatment operators, and recyclers in a cohesive and efficient manner. **Cycle Data Platform**, equipped with its powerful identification tool and digital IDs, seamlessly integrates into the manufacturing process, ensuring that products are not only traceable but also imbued with lasting value throughout their lifecycle.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		

IT architecture: Data use	Labeling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

Cycle Data Platform boasts highly scalable architecture, creating a seamless connection between brands and suppliers within its unique platform. Designed with agility in mind, it effortlessly meets emerging product passport requirements while enabling efficient supplier data exchange today, all while remaining easily expandable to adapt to evolving guidelines.

Utilizing a robust cloud formation infrastructure based on hyperscaler microservices, the platform enhances security, ensures top-notch quality, and maintains exceptional levels of maintainability and data integration. Its hybrid infrastructure facilitates seamless transactions and instant data exploitation, while creating a solid digital instance of each product.

Moreover, its customizable features provide a tailored experience, catering to the specific needs and preferences of each user.

Maturity level and application sectors

Cycle Data Platform exhibits a mature development stage. Its robust architecture and functionality suggest a high level of maturity. The application sector is the textile industry, considering this is the main activity of the company as a whole. Moreover, the platform's readiness indicates a strategic approach, tailored to meet industry-specific needs. As it progresses to the implementation phase, rigorous testing and refinement will further enhance its applicability, ensuring a seamless integration into the textile sector's workflows, connecting brands, retailers and consumers.

DDCC

Digital Data Chain Consortium (DDCC)							
The Digital Data Chain is a technology stack consisting of three solutions: (1) identification of objects based on IEC 61406-x – Identification Link, (2) digital manufacturer information, conform to VDI Guideline 2770 (to become IEC standard in 2023) and (3) information exchange platforms for the provisioning of object data and information along the supply chain and over the whole object lifecycle.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

(1) The Digital Data Chain offers a full-fledged technology stack with comprehensive solutions for identification, intelligent product documentation (manuals, drawings, spare part lists, certificates) and platform solutions for the provisioning of the documentation and information between manufacturer, owner/operator and service provider. This solution has been developed by the industry for the industry. Compared to other solutions from the B2C sector, that only cover basic requirements like ID and basic technical attributes, the Digital Data Chain covers all requirements of the producing industries, especially authority or legal/statutory documentation requirements.

(2) To preserve and ensure the competitiveness of European manufacturers the technical solutions used for the DPP must be 100% cost free and open source. Otherwise, the European manufacturer will have to pay more for imported intermediate and preliminary products compared to non-European competitors and therefore loose competitiveness. If payable technologies were chosen for the DPP this would cause significant economic damages for European manufacturers. Compared to other solutions like EPCIS/Oliot the AutoID solution and the intelligent documentation solution of the DDC are 100% cost free. There is no protected IP, hidden costs or paid prerequisites to use the solutions of the DDC.

Maturity level and application sectors

The Digital Data Chain started as B2B solution for production hardware used in the chemical industry. It spread quickly to all sectors that use the same hardware for production such as pharmaceuticals, food & beverage, water & wastewater, infrastructure, oil & gas and power generation. Other industries like aeronautics, automotive and machinery are starting PoCs for implementation. The Digital Data Chain is already implemented by global players like Siemens, BASF, Bayer, etc. but also SMEs. In total the DDC technology stack is implemented or under implementation at 500+ companies worldwide. The estimated worldwide market volume of goods provided with DDC technologies till 2030 is 10+ billion EUR.

- SAMSON Product Video: https://www.youtube.com/watch?v=YVDFUrAzvRY
- LESER Product Video: https://www.youtube.com/watch?v=jZk6XZSJlCg

- EMERSON Product Video: https://videos.emerson.com/detail/video/6232376213001/find-spare-parts-using-qr-codes
- DDC Consortium official website: https://www.digitaldatachain.com
- Press release concerning the collaboration between DDC Consortium and Industrial Digital Twin Association (IDTA) regarding the Digital Twin: https://digitaldatachain.com/portal/news

DDC at the ACHEMA 2022, the world leading fair for production hardware in the chemical and pharmaceutical industry. Exhibition of 20+ DDC conform products on the DDC fair stand from different manufacturers. In total 100+ manufacturers showed their DDC conform products on their company fair stands on the ACHEMA 2022.

DIBICHAIN

DIBICHAIN							
DIBICHAIN aims to map material and product life cycles using distributed ledger technology (DLT) to enhance circular economy.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		
Unique technical aspects							
Considers the concerns of companies exposing their full identity on the ledger.							

Maturity level and application sectors
Maturity level: prototype level. **Useful links:** https://dibichain.com/ https://www.blockchainresearchlab.org/wp-content/uploads/2020/05/BRL-Working-Paper-No-18-DibiChain.pdf https://github.com/chainstep/dibichain-demo

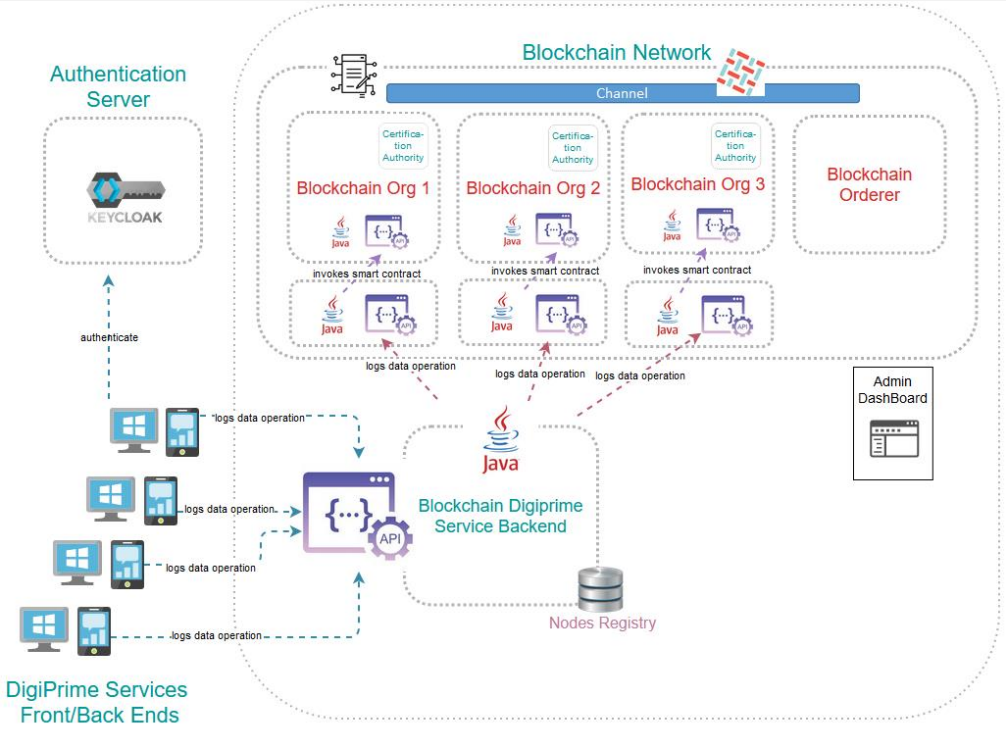
DigiPrime

DigiPrime						
Focuses on enabling cross-sectorial applications of circular products by (1) federated platform architecture (2) circularity-oriented services and (3) value-chain integration services.						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others	
	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
	If advanced	Attribute based		Role based		
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)		Others		
Unique technical aspects						
DigiPrime is a decentralized federated platform with general purpose data structures to allow maximum customizability and pluggability of services to allow processing and sharing of data across value-chains. Platform infrastructure acts as a container for business services and circular entities shared across the services that agreed to share the entities. Topics like the product						

management and the certification of a product are made by services, dedicated to a sector (like battery, automotive, etc.) or cross-sectorial. Some of services implement typical DPP features like product data provenance, traceability and anti-tampering proofs. Traceability of data inside the platform is implemented by using a blockchain technology and smart contracts. Key strength of the platform is the easy extensibility, allowing many kinds of services made by very different technologies to be installed in the platform and integrated with the platform polymorphic database.

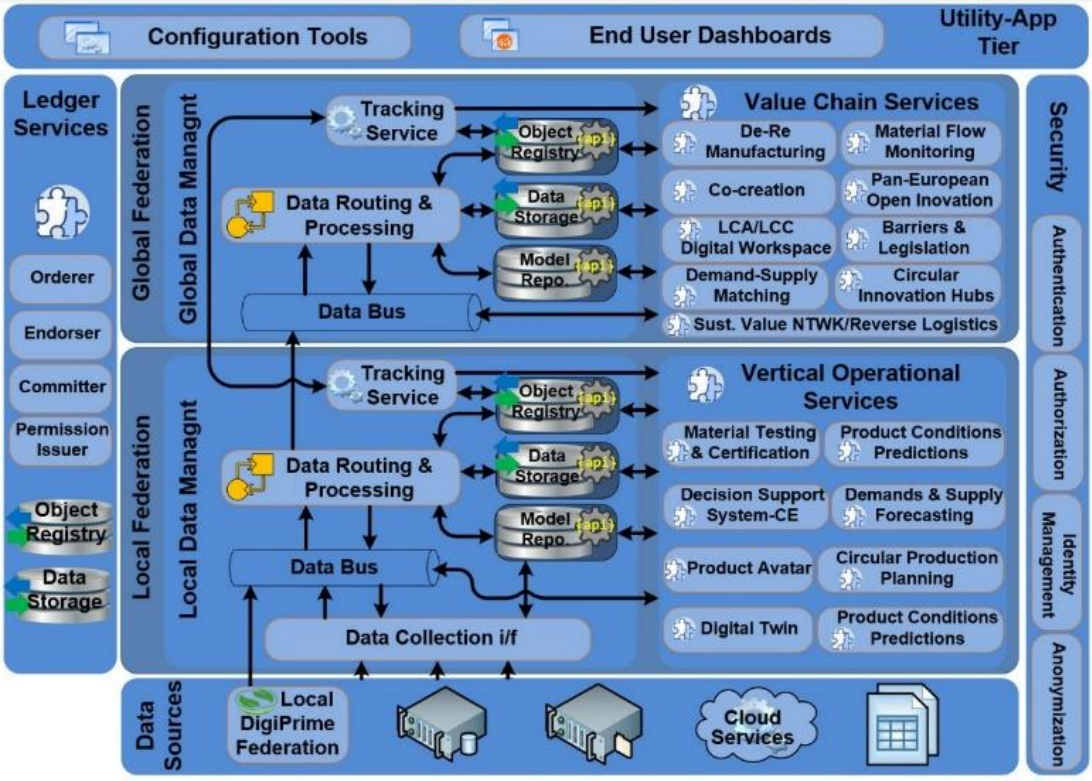
Maturity level and application sectors

The platform infrastructure and the services have been validated in a live environment, by satisfying a set of use cases defined for the DigiPrime platform. Maturity is TRL8 for the infrastructure and the core platform services. DigiPrime Services maturity ranges from TRL5 to TRL9: integration of new services is ongoing, so to extend the existing functionalities to all the sectors. The main sectors of application are Battery, Automotive, Solar Power, Textile, Composites and Techno-Polymers.



Useful link:

https://www.digiprime.eu/


Configuration Tools
End User Dashboards
Utility-App Tier
Ledger Services
Orderer
Endorser
Committer
Permission Issuer
Object Registry
Data Storage
Global Federation
Global Data Managnt
Tracking Service
Object Registry
Data Routing & Processing
Data Storage
Model Repo
Data Bus
Value Chain Services
De-Re Manufacturing
Material Flow Monitoring
Co-creation
Pan-European Open Inovation
LCA/LCC Digital Workspace
Barriers & Legislation
Demand-Supply Matching
Circular Innovation Hubs
Sust. Value NTWK/Reverse Logistics
Local Federation
Local Data Managnt
Tracking Service
Object Registry
Data Routing & Processing
Data Storage
Model Repo
Data Bus
Data Collection i/f
Vertical Operational Services
Material Testing & Certification
Product Conditions Predictions
Decision Support System-CE
Demands & Supply Forecasting
Product Avatar
Circular Production Planning
Digital Twin
Product Conditions Predictions
Data Sources
Local DigiPrime Federation
Cloud Services
Security
Authentication
Authorization
Identity Management
Anonymization

Digital Product Passport

Digital Product Passport
Through an entry-point and supported by manufacturers, we digitize the characteristic data of an asset by creating the Digital Product Passport. The data are grouped according to a product master sheet containing categories: • General data • Identification numbers • Technical specifications • Rating of the asset Within the D.P.P. there is the ability to enter events related to the asset's history, such as maintenance occurrences or certifications achieved. Data can be viewed by manufacturers via a dashboard and by end customers via mobile app.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

The uniqueness of the MyLime platform is ensured through the patented system to authorized parties. Data entry into the D.P.P. and notarization in Blockchain, are allowed to the manufacturer and those in the authorized network (authorized workshops, dealers).

Maturity level and application sectors

MyLime was founded in 2018 in Cremona, Italy. The solution is TRL-9 (since 2020 with St. Gobain project, smart windshield traceability). Consists of a team of experts in the field of blockchain and RFID technology. We operate in the luxury goods market with a focus on mobility. We currently offer service to clients in the bike, car, and yacht industries, interfacing with both manufacturers and Tier1.

Useful links:

https://my-lime.com/

https://www.colnago.com/stories/colnago-first-bicycle-manufacturer-to-adopt-blockchain

DigiTrax

DigiTrax							
DigiTrax™ is a digitally connected product lifecycle solution that enables journey tracking, product authentication and engagement, facilitating full control across all areas of your brand protection and Digital Product Passport operations.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		
Unique technical aspects							

Maturity level and application sectors
DigiTrax™ supports customers globally, across a range of market sectors, with their authentication and track and trace requirements. **Useful link:** DigiTrax™ Product Authentication | Digital Product AuthenticationTechnology – Authentix https://authentix.com/solution-technologies/digital-authentication/

Dippi

Dippi
Dippi is enhancing product transparency through innovative digital solutions. Our flagship product, Digital Labels, has enabled the wine market to comply with EU regulations, allowing consumers to access essential product information via QR codes on our clients' products. Our overarching mission is to empower consumers with comprehensive insights, fostering trust and informed decision-making. The platform has also expanded its reach into the furniture and textile industry, with the intent to advance the progress of the circular economy.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Our platform utilizes QR code and RFID technology, which facilitates easy access to product information for consumers. The information is available for the consumer in a multitude of languages and regions, provided by our platform which manages product details that have been tailored for the intended market and its regulatory compliance. With customizable features and user-friendly interfaces, our software assists industries on their path toward conformity which in turn fosters consumer trust.

Maturity level and application sectors

Dippi is currently active in multiple European markets, with notable involvement in the wine industry where the producers utilize our DPP platform to comply with Regulation (EU) 2021/2117 on wine labeling.

We facilitate compliance with regulatory standards using a highly adaptive solution that can extend to many other sectors, commencing with furniture and textiles, where we aim to provide support in managing and sharing product details. Currently, we operate within a wide range of industries, where we directly assist companies and other stakeholders to overcome the operational challenges of the upcoming regulatory changes.

Useful link:

www.dippi.app

DNV

DNV Digital Product Passport						
DPP infrastructure based on proven industrial supply chain data collection solution with integrated data validation						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others	
	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
	If advanced	Attribute based		Role based		
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)		Others		
Unique technical aspects						

The key feature of the DNV product passport is twofold:

- First, DNV's decades of experience in the certification and assurance domain allows to define the data stack for the establishment of a green claim to be fully in line with

specifications of scheme owners or regulators. This knowledge is crucial at the outset of the establishment of a DPP program to make it coherent and compliant. Part of this is also, a definition of where and how to source data from either existing legacy systems or to ingest data manually or semi-automatically with a robust verification mechanism to avoid accidental or intentional data tampering/misrepresentation.

- Second is the use of proven traceability, serialisation technology that enables all key features as foreseen by the EU DPP (e.g. proof of provenance, unique/batch/product line identification, full track and trace, attachment of additional datasets to product/batch/etc. – such as social/environmental audit data etc.

Maturity level and application sectors

The DNV DPP is based on industrially proven serialisation and traceability technology, currently in use in several large-scale deployments across various industries (e.g. food, apparel/textiles, industrial products)

DNV's knowledge and expertise for claim and process verification and assurance spans decades and 100k plus customers

Dyne

Dyne

Developed within the Interfacer Project, FabCityOS is an operating system – a standard set of decentralised tools, using the standard vocabulary of Valueflows to describe the nature & relationships of collaborative creations. It has been developed to be compatible with the aims laid out by the EU ESPR which defines DPPs as the technical keystone to:

- Increase sustainability.
- Achieve a circular economy.
- Minimise energy & primary resource consumption.
- Provide product locality information.
- Provide detailed insights to assess mass production models.

Dyne's DPP implementation is designed to empower autonomous communities to create & collaborate in distributed design & manufacturing value chains across all participants & facilities by providing verifiability of contributions made to each product.

Dyne's DPP portable linked data structure offers verifiable cryptographic objects that can be stored in any blockchain or distributed ledger.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

ValueFlows (VF) is based on a REA economic model (Resources, Events, & Agents) to describe flows of economic resources within distributed economic ecosystems & defines a casual graph object relationship.

- **Resources**: including digital designs & physical products & services.
- **Events**: past actions applied to Resources; create, modify, consume, use, or transfer from one Agent or Location to another.
- **Agents**: individuals/orgs who perform Events affecting Resources.
- **Processes**: containers for Events & Resources.

Zenflows (ZF) integrates multi-party signature cryptography to produce DPPs that link to the distributed VF trace graph over the entire product life cycle, allowing for a cumulative claim of contributions made across a product's life cycle, producing portable cryptographic objects & supporting multiple blockchain flavours.

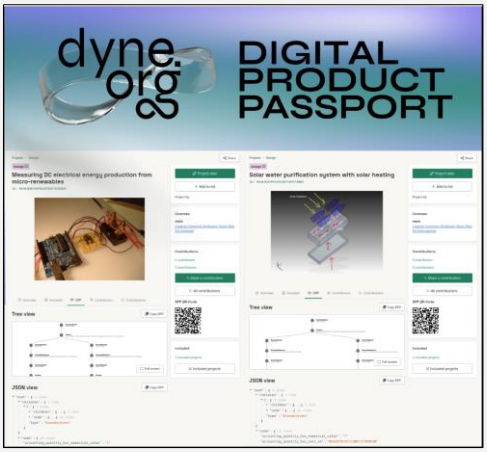
ZF utilises the W3C DID standard for decentralised identifiers & ActivityPub for networking. This empowers digital sovereignty & federated cooperation.

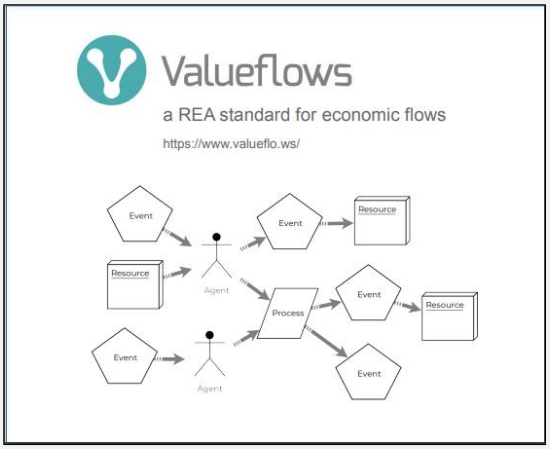
Maturity level and application sectors

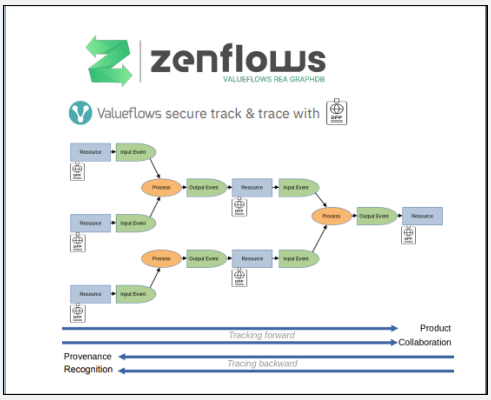
Dyne's implementation is a culmination of over more than 7 years of EU R&D public domain development in open data, cryptography & developer/end-user engagement. Focused on self-sovereignty, transparency & auditability, the entire stack is open source & designed on open protocols & standards. For modular interoperability, the design is federated & decentralized. The modularity & blockchain agnostic implementation allows interoperability with multiple blockchain/DLT flavours, or any other common-trust-root technologies.

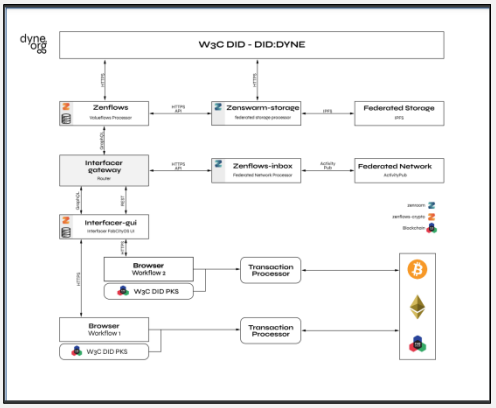
Atomic REA event flows as portable cryptographically assured objects ensure open compatibility across all application sectors and cooperative participants of all sizes (from individuals to SMEs to multinationals)

Because the architectural approach is open, modular and standards-based, it is easily integrated with other tools, applications & systems; from physical manufacturing & logistics to digital products such as art & source code.









Useful links:

Live Instance: https://interfacer.dyne.org

Documentation: https://interfacerproject.github.io/interfacer-docs/#/

EasyBat

EasyBat

To date, lifecycle asset management for batteries has been cumbersome at best. Before EasyBat, tracking battery assets was essentially non-existent. Currently, in Belgium, the registration of customer-owned assets, such as a home battery, requires a lot of information and burdensome paperwork collection.

EasyBat aims to greatly simplify that process. The solution focuses on the entire battery lifecycle by creating a digital passport which third-parties such as the manufacturer, installer, and/or DSO can verify. Such a DER Passport provides a shared state of the asset and its history to any pre-approved energy market participants. Original equipment manufacturers (OEMs), distributors, installers, and accredited inspection and certification organisations issue and verify every relevant asset transaction throughout a battery's lifecycle.

EasyBat heavily leverages the open-source EW-DOS technology stack, including EW Switchboard, a new interface for managing decentralised, self-sovereign identities, as well as their associated assets, roles, and permissions.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others
Unique technical aspects				

EasyBat project is an asset lifecycle management project leveraging the use of Decentralised Identifiers (https://www.w3.org/TR/did-core/). Under this project, each battery has a unique DID and several stages in the life of a battery are recorded in the battery's DID serving as a digital passport.

Organisations themselves also have a role; these include:

- Governing Body: this could be a single or group of organisations. e.g. bebat. A single or group of organisation will have a Decentralized Identifier (DID).
- Asset: it is an eligible asset mentioned by governing body. e.g. battery, inverter, PV, EVSE, car. Each asset has a Decentralized Identifier.
- OEM: this could be an asset manufacturing company, producing finished products like Batteries. Each OEM will have a Decentralized Identifier(DID).
- Asset Installer: it is a certified professional or an organisation allowed to install assets (only qualified).
- Asset Verifier: a designated individual from an organisation to verify correctness of asset installation.
- Asset Owner/User: an individual or organisation owning or leasing the asset.

DLT technology is also used. More specifically, ERC 1056 and ERC 1155 standards have been utilized for this project.

- ERC 1056 can convert any externally owned Ethereum account to DID and support management of delegation and serviceEndPoints. It considers all valid Ethereum addresses as valid DID. A DID can have manages its own delegation and attributes. The implementation of ERC 1056 allows to maintain a registry of DIDs.
- ERC 1155 is a multi-standard token standard that include any combination of fungible, non-fungible tokens, or other configurations. The ERC 1155 approach can be extended to use a single ERC 1056 instance to create and manage proxy identities. This allows to:
    - update the owner of a DID without changing the DID uniform resource name (URN)
    - add/update metadata URI to the Proxy Identity (without the need of using serviceEndpoints)
    - add/remove recovery agents
    - add/remove delegates

Attributes per battery recorded in the digital passport include:

- Manufacturer: manufacturer of the battery [string]

- Model: model of the battery [string]
- Capacity: capacity of battery in kWh [float]
- Serial Number: serial number of the battery [string]
- Chemical Type: chemical type of the battery [string]
- Weight: weight of the battery in kg [float]

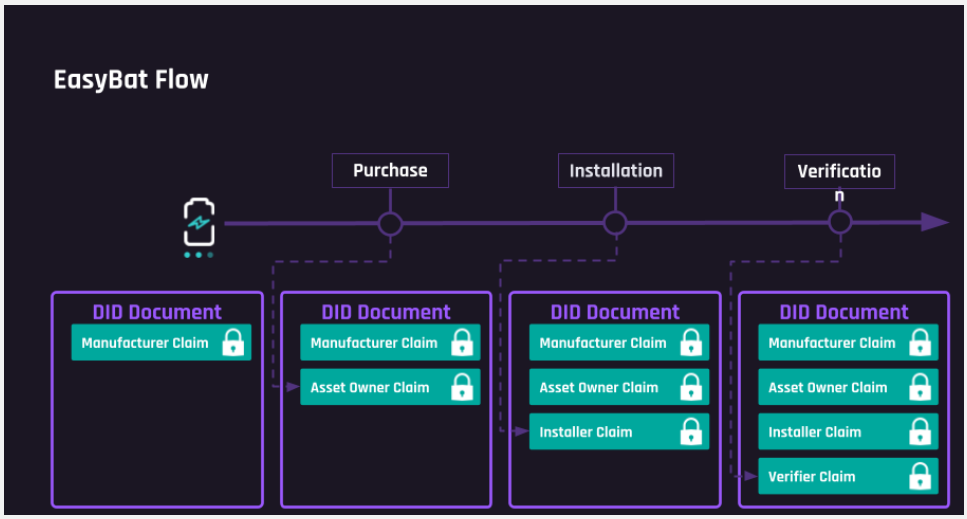
QR Code specification:

- Universally Unique Identifier (UUID) generated 128 bit QR code.

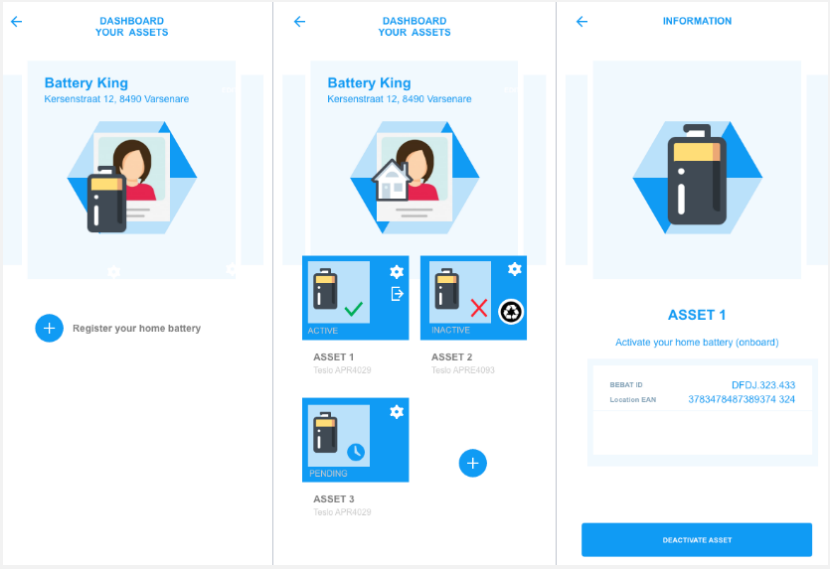
Maturity level and application sectors

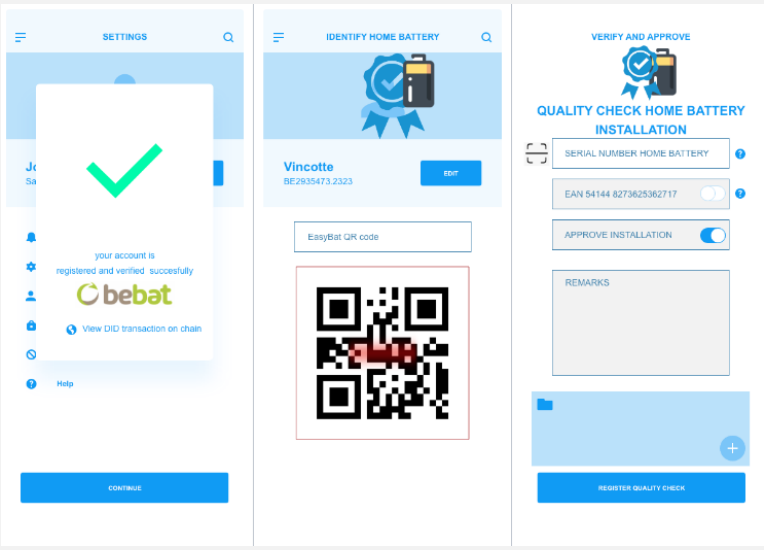
The EasyBat project is a Minimum Viable Product (MVP) that only focuses on the battery sector. A first beta release has been successfully tested and upcoming iterations are planned (still work in progress).

EasyBat DID flow:



Pictures of EasyBat wireframes:





Useful links:

https://easybat-dev.energyweb.org/
https://github.com/energywebfoundation
https://medium.com/energy-web-insights/bebat-launches-easybat-an-open-source-decentralized-solution-for-battery-lifecycle-management-281f2ace61e9
https://pers.fluvius.be/bebat-en-fluvius-lanceren-easybat-om-levensloop-batterijen-beter-op-te-volgen-via-blockchain

Elision

Elision - Digital Product Passport

Elision Collaborative DPP is a SaaS solution allowing brands to gather and manage product traceability and sustainability information and making them available to consumers, engaging experiences with them.

The Collaborative DPP initiative tracks and verifies the origins and movements of raw materials and components, tracks all the manufacturing internal and external phases and logistics & distribution along the whole product life cycle (through complex supply chains) up to the delivery of the finished products.

Sustainability information include Product Carbon Footprint, Suppliers due diligence and Certifications, recycled content information, etc.

Data are gathered from different backend platforms such as SRM, MES, PLM, IOT devices on the field and others in a collaborative manner, to allow all actors throughout the product life cycle to share the required information.

Collaborative DPP is able to manage full Product upstream and downstream Traceability and Genealogy and the connection between Finished Products lots/serial numbers and Components and Raw materials lots, including with link with all the Manufacturing phases (internal and external) work orders with Backward/Forward inquiry functionalities. Backward inquiry, given a finished product lot, is able to identify all the different raw material and components used for the finished product, all the manufacturing phase, dates and location, all the product certifications. Forward inquiry, given a raw material lot, is able to identify all the finished products lots and serial numbers produced with that raw material lot.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
	Level	Simple			Advanced		

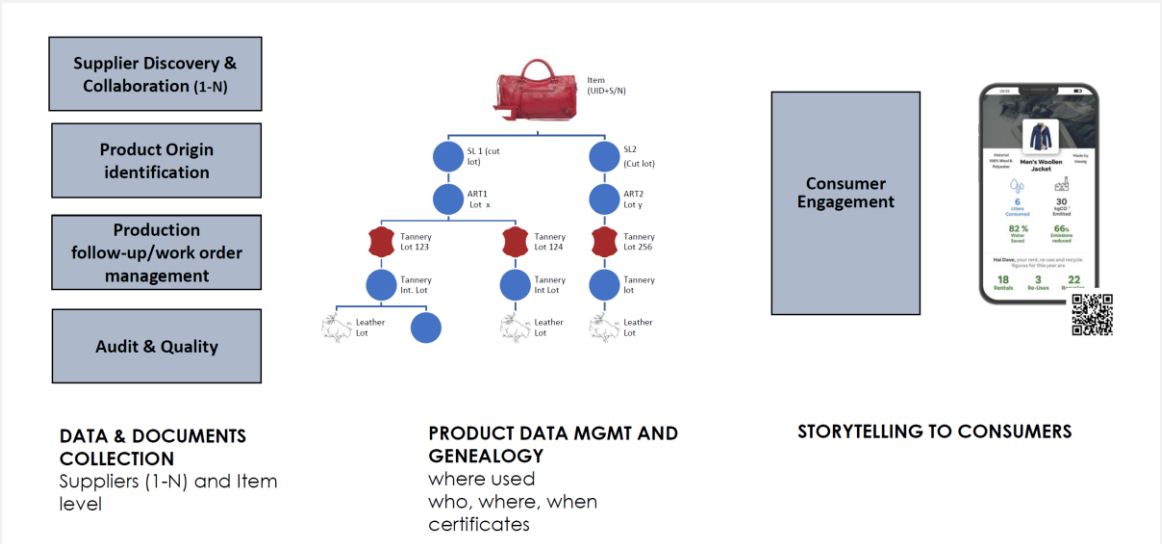
IT architecture: Access control	**If advanced**	Attribute based	Role based	
IT architecture: Data use	Labelling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Capacity of managing big data amount, backward and forward inquiries capabilities, and integration with external systems and external data sources.

Maturity level and application sectors

Our solution has maturity level "Defined". We are running Pilots with promising results that support real-world (business) cases. Our implementation process is mature and we have a standardized project approach.



Environmental Data in Industry 4.0

Environmental Data Industry 4.0
The focus of this project was the identification and utilisation of environmentally relevant data for companies in an industry 4.0 environment. For this purpose, the first step was to prepare and analyse legal regulations at EU and national level, containing reporting obligations on environmentally relevant data of companies, in form of factsheets, to discuss them with experts and to identify environmental data points on this basis. Voluntary reporting, such as various environmental assessment systems, were also examined with regard to suitable environmental data points. The derived environmental data points were then compiled into environmental data sets, which form an initial basis for designing the asset administration shell submodel environment and are suitable for use in an industry 4.0 environment. The two environmental data sets, one for industrial plants and a second for products, were presented and discussed at expert workshops and tested at various companies.

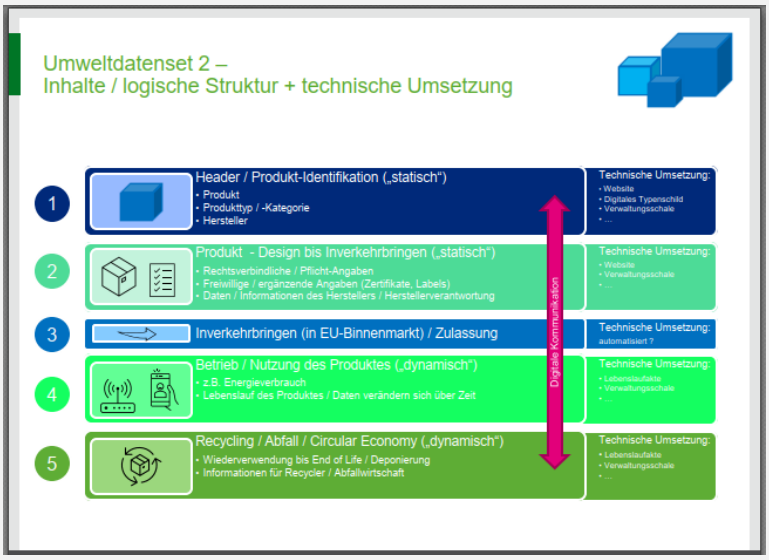
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials			Others
	Convenience	Wallet		Data Ports			Others
	Data protection	PETs		Anonymization			Others
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

First of all the designed environmental data set is a logic model and not linked to a specific implementation technology. It is based on the asset administration shell (AAS), an industry 4.0-model, has been further processed and tested within the framework of another project (InterOpera) and a first AAS-submodel environment has been developed.

Maturity level and application sectors

The maturity level of the model / logic design is advanced and based on the asset administration shell model (AAS) which plays a key role in the implementation of industry 4.0. The environmental data set for products, which has been developed and tested, consist of a `header´ and a `body´ (see figures) and is applicable to any product, material and sector.



EON

EON							
EON is retail's leading product digitisation platform. We connect physical products with a Digital ID to make them more traceable, interactive, and valuable.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labeling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

The Product Cloud is an extensible data-centric application that allows brands to frictionlessly ingest product and event data from disparate sources, transform, harmonise, and resolve the data to support interoperability. This data management and orchestration layer allows brands to track, report and analyse on all aspects of a products lifecycle. EON's Data Ingestion/Pipeline tool offers a low-code/no-code intuitive self-service UI and underlying services to orchestrate data movement along with offering data mapping, transformations and processing reporting. Specifically designed to handle complexity automatically.

- Supports ingesting data from diverse and multiple sources.
- Supports all major data stores and file formats.
- Supports industry data standards just as EPCIS, Circular Data Protocol, etc along with brand defined data standards.
- Quickly analyse product data to determine compliance state based on brand defined policy scopes.
- Data governance, performance, scalability, and security built in.

Digital Link Resolver - Programmatic redirects with a robust rules engine. Certificate of Ownership - AI based rules engine along with optical character recognition and blockchain agnostic. Multi-layered brand protection approach which combines overt, covert, and digital authentication techniques. Exploration, Intelligence & Insights Lab. Traceability Manager. Customer Experience Studio. EON Exchange.

Maturity level and application sectors

EON powers product digitisation (Digital ID) for the largest global brands and retailers — with partners and clients like H&M, Chloe, Target, Mulberry, Kathmandu, Giorgio Armani, Brunello Cucinelli, Coach, Victoria Secrets and many more. We are an enterprise ready SaaS platform, with experience deploying Digital Product Passports across complex global organisations, and in many geographies. Our platform specialises in data sharing and data exchange between brands and resale and recycle partners, with some of the largest players in the world like Vestiaire Collective and Waste Management connecting in through the EON product digitisation platform.

Reference and Useful links:

Forbes: This Technology Will Have a Profound Effect on the Fashion Industry
Vogue Business: Digital IDs — a game changer for fashion
Vogue Business: Chloe moves ahead on commitment to give all products Digital ID
EU Commission invites EON — learning from frontrunners, Digital Product Passports
EON pioneers Circular Data Protocol with H&M, GS1, EU and more — foundation for Digital Product Passport legislation
Business of Fashion: What Digital IDs can do for Fashion with Natasha Franck x Natalie Massenet
Forbes: Could fashion's digital tag, EON, help fashion become circular?
Forbes: Carbon Labels, Digital Passports And Traceability Tags – Clothing Labels' New Normal

ENSESO

ENSESO							
ENSESO's GS1 compliant, multitenant, end to end traceability platform links different digital trigger technologies, such as UHF RFID, NFC, BLE or 2D barcodes such as QR and Datamatrix, to one unique digital ID, enabling supply chain visibility of item-level events and transforming product data into insights, connected in one end-to-end cloud-based platform.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

- Uses global messaging standards, such as GS1 EPCIS and GS1 digital link
- Multitenant cloud solution for seamless interoperability with supply chain partners
- System access using web based interface or API
- Mobile applications available on Android and iOS operating systems
- IoT capability to enrich standard supply chain data with sensor data such as temperature, humidity, air pressure etc.
- Database less generation and verification of unique identifiers
- Tagging technology agnostic - UHF RFID, NFC, BLE, QR, Datamatrix
- Multilingual capability
- Fully configurable workflow using CTE (critical tracking events) and KDE (key data elements) enables fast and effective system configuration for any industry
- System granularity from product level down to single item level with support for aggregation
- Strong analytical capability - trace back / trace forward

Maturity level and application sectors

ENSESO has traceability experience & knowledge across industries since 2012. Our end to end traceability platform has been used in dozens of installations for pharmaceutical traceabilty in regulated environments such as US DSCSA and EU FMD. Further more, several EU countries are using our traceability platform for compliance with EU TPD (tobacco products directive) since 2019. Also, our presence within food sector has been acknwoledged by US FDA, where ENSESO is a winner of the FDA's New Era of Smarter Food Safety Low- or No-Cost Tech-Enabled Traceability Challenge in 2021.

Application Sectors: pharma, textile, tobacco, electronics, food, batteries, wine, toys etc.

Useful links:

https://www.enseso.com

https://enseso.com/hr/iot-sensors/

https://www.youtube.com/watch?v=c0_uO-GLP5o

EPEAT Ecolabel

EPEAT Ecolabel
EPEAT is a global Type 1 Ecolabel for electronic products, including ICT products and photovoltaic modules. It is used by purchasers world-wide to identify sustainable electronic products. EPEAT consists of 3 elements: 1) Lifecycle-based performance criteria for the product, supply chain and company in 4 areas – carbon/greenhouse gas reduction, circularity, chemicals of concern and corporate supply chain due diligence (social) performance; 2) 3rd party conformance assurance system; and 3) Public, searchable product registry (www.epeat.net) that identifies products awarded the EPEAT ecolabel.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials			Others
	Convenience	Wallet		Data Ports			Others
	Data protection	PETs		Anonymization			Others

	Traceability	Tagging (QR, NFC, RFID)	Others

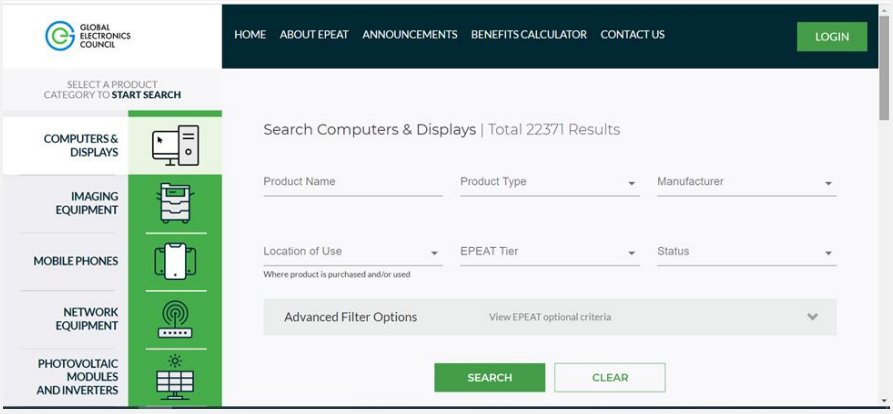
Maturity level and application sectors

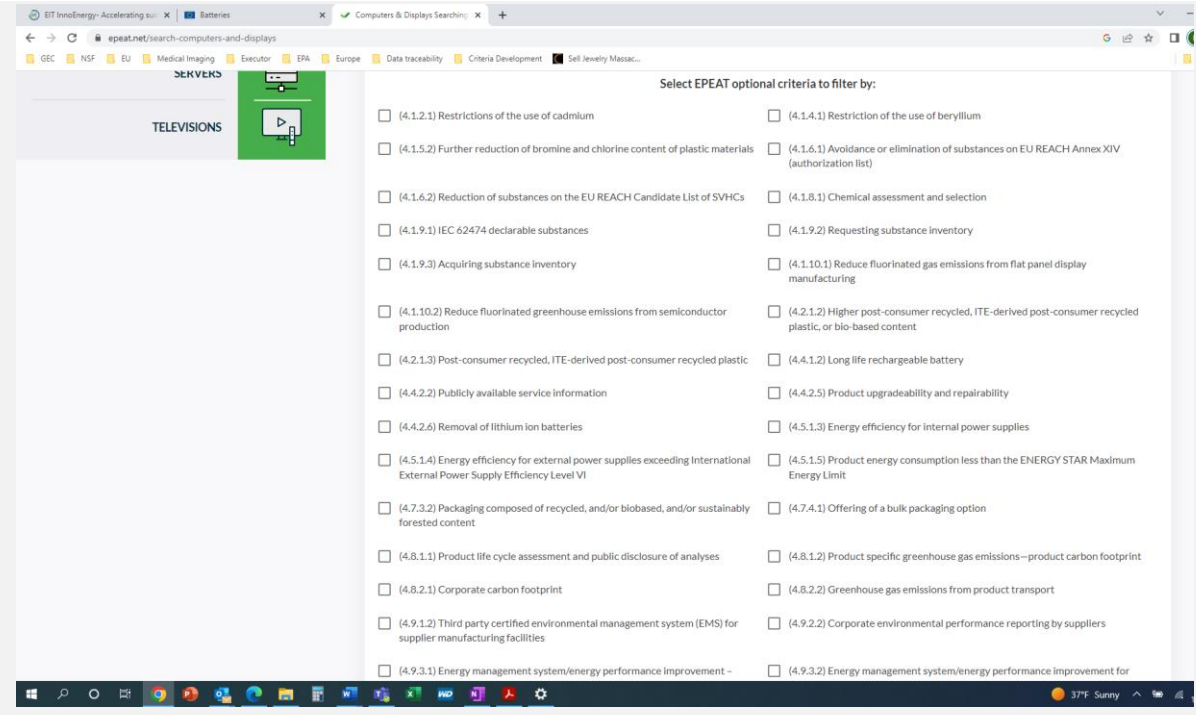
Electronics sector; applicable to finished products including computers, displays, imaging equipment, mobile phones, televisions, servers, network equipment & photovoltaic modules. EPEAT (www.epeat.net) was launched in 2006. Currently (Nov 2022), over 60 global and regional electronics brands participate and over 4000 unique products carry the EPEAT ecolabel. EPEAT has minimum criteria that must be met to be awarded EPEAT (bronze), products attain higher levels of recognition for meeting more aspirational, optional criteria (silver and gold).

The EPEAT platform has a "back end" that is accessible by password only. Manufacturers enter data for performance criteria. Independent Conformance Assurance Bodies (CABs) and EPEAT Program verify data entry and review evidence submitted by manufacturers. The public-facing registry allows users to identify products (by model) that meet EPEAT and download data in Excel format. EPEAT also provides API data feeds using unique product identifiers.

EPEAT provides a public searchable Registry at www.epeat.net. Products are organized by category as shown on left.

Registry can be searched by product name, type, manufacturer, country of use, and EPEAT Tier.




SERVERS
TELEVISIONS
Select EPEAT optional criteria to filter by:
(4.1.2.1) Restrictions of the use of cadmium
(4.1.4.1) Restriction of the use of beryllium
(4.1.5.2) Further reduction of bromine and chlorine content of plastic materials
(4.1.6.1) Avoidance or elimination of substances on EU REACH Annex XIV (authorization list)
(4.1.6.2) Reduction of substances on the EU REACH Candidate List of SVHCs
(4.1.8.1) Chemical assessment and selection
(4.1.9.1) IEC 62474 declarable substances
(4.1.9.2) Requesting substance inventory
(4.1.9.3) Acquiring substance inventory
(4.1.10.1) Reduce fluorinated gas emissions from flat panel display manufacturing
(4.1.10.2) Reduce fluorinated greenhouse emissions from semiconductor production
(4.2.1.2) Higher post-consumer recycled, ITE-derived post-consumer recycled plastic, or bio-based content
(4.2.1.3) Post-consumer recycled, ITE-derived post-consumer recycled plastic
(4.4.1.2) Long life rechargeable battery
(4.4.2.2) Publicly available service information
(4.4.2.5) Product upgradeability and repairability
(4.4.2.6) Removal of lithium ion batteries
(4.5.1.3) Energy efficiency for internal power supplies
(4.5.1.4) Energy efficiency for external power supplies exceeding International External Power Supply Efficiency Level VI
(4.5.1.5) Product energy consumption less than the ENERGY STAR Maximum Energy Limit
(4.7.3.2) Packaging composed of recycled, and/or biobased, and/or sustainably forested content
(4.7.4.1) Offering of a bulk packaging option
(4.8.1.1) Product life cycle assessment and public disclosure of analyses
(4.8.1.2) Product specific greenhouse gas emissions—product carbon footprint
(4.8.2.1) Corporate carbon footprint
(4.8.2.2) Greenhouse gas emissions from product transport
(4.9.1.2) Third party certified environmental management system (EMS) for supplier manufacturing facilities
(4.9.2.2) Corporate environmental performance reporting by suppliers
(4.9.3.1) Energy management system/energy performance improvement –
(4.9.3.2) Energy management system/energy performance improvement for
37°F Sunny

eReuseDPP

eReuseDPP/Usody							
A DPP architecture and pilot for the circular management of ICT devices in use.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		
Unique technical aspects							

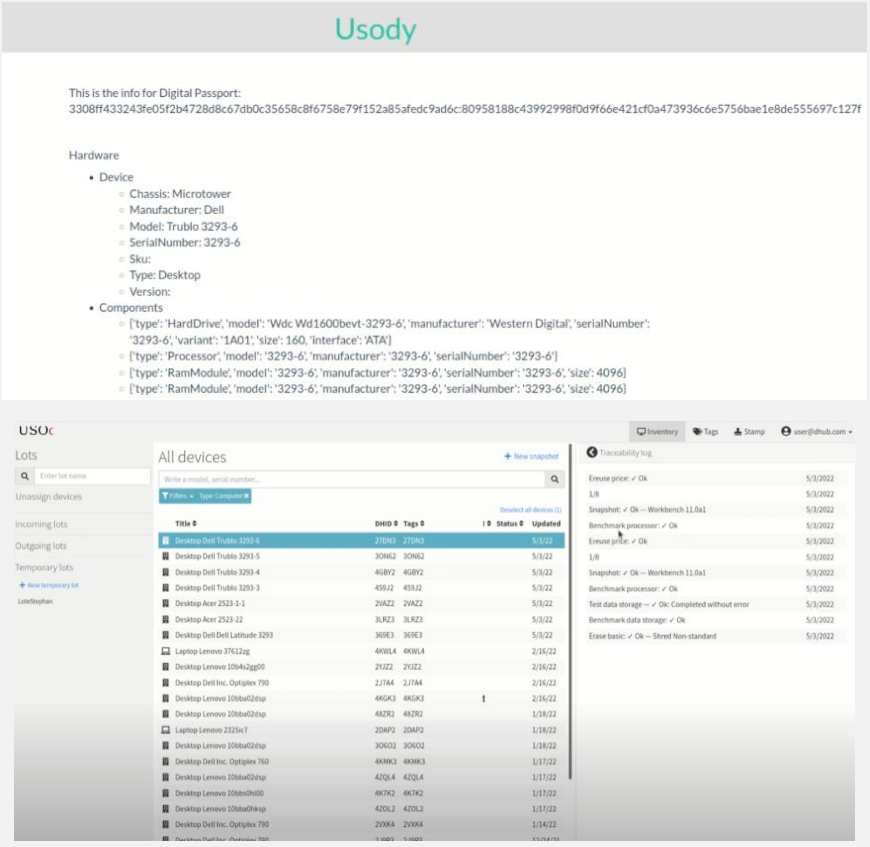
The eReuseDPP system manages an inventory of digital device product details combined with a ledger of device lifecycle events. The ledger is recorded in a verifiable registry, equivalent to the function of a notary public, that offers transparency and accountability about the detailed data. The verifiable registry relies on an append-only distributed ledger, which can apply agreed on rules about procedures when a condition is met (smart contracts, inexorability). We have integrated it into

DeviceHub, an open-source device inventory system that acts as a client and intermediary on behalf of human device owners that can record supporting digital details and content and generate and deliver digital product passports (JSON and HTML formats currently). The product and part details are retrieved using an open-source hardware inspection software that creates secure documents (snapshots).

Verifiable proofs and decentralised identifiers follow the W3C DID model. The verifiable registry is DLT agnostic and mapped into two backends: a permissioned Ethereum, and IOTA DLT.

Maturity level and application sectors

TRL 7 - System prototype demonstration in operational environment. The prototype manages about 20 thousand ICT devices and generates simple DPPs for these products as they change hardware configuration during lifespan due to repair, refurbishment, usage, while recording proofs in a verifiable registry linking changes to documents (snapshots), timestamps and summaries.



Eslando Relabel

Eslando Relabel							
Eslando is a circular fashion tech company on a mission to accelerate textile recycling. We're revolutionising textile recycling, making it easier than ever to recycle greater volumes of post-consumer textiles. With our innovative digital product passport & linked sorting software, we are empowering fashion brands, sorters and recyclers to unlock the true potential of post-consumer clothing waste.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

We have developed a unique LLM to make the process of digitising fashion brand's SKU easy and frictionless for brands. With a single file upload and within seconds a unique QR DPP can be generated.

What sets us apart is our exclusive focus on the end-of-life of garments and recycling. Our DPP is an indispensable tool for those involved in garment sorting and recycling.

Maturity level and application sectors

The first part of our product, i.e, to collect and categorise product data is complete. Our first MVP will be available in 2nd half of 2024, to be tested in planned pilots.

Useful links:

www.eslando.com

ettos

ettos
ettos, headquartered in Nottingham, UK, offers a comprehensive digital platform aimed at revolutionising transparency and trust within the fashion supply chain. Our SaaS platform enables brands to create QR-coded digital product passports for their textile products, allowing customers to trace the entire lifecycle of their clothing. With a focus on environmental and ethical claims, the platform fosters collective responsibility among brands and suppliers, serving as a centralised hub for real-time data, certifications, and evidence. Through the platform, brands can promote circular business models like their resale, reuse, and recycling schemes, supporting emerging standards for sustainable product regulation. The platform efficiently handles large quantities data, ensuring flexibility and speed in collecting, structuring, and sharing traceability information.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

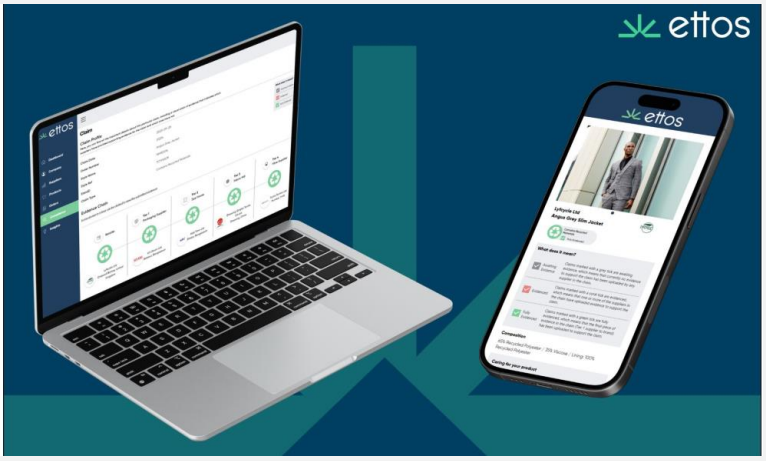
Unique technical aspects

ettos is a scalable forward-thinking B2B SaaS platform with a strong focus on data security, which aims to enhance transparency in the fashion supply chain. The following are a few of the unique features that the platform offers:

- Digital Product Passports: Utilises QR codes for Digital Product Passports, linking product supply chains to consumer-friendly overviews.
- External Data Apps: Facilitates easy connection of external data apps for streamlined processing of product information.
- Transparency Insights: Generate traceability insights across each brands product portfolio, enabling them to visualise their journey to full supply chain transparency.
- Advanced Notifications Systems: Push notifications inform users of pending tasks and required actions within the system.
- Evidence Chain: Track and monitor batch level green claims through the industry's most prominent standards and certifications, with access to real time evidence and status updates.

Maturity level and application sectors

Founded by the Lyfcycle group and operating globally, ettos continuously refines its services based on feedback from process implementation, piloting, and scaling. With a focus on scalability, role-based access control ensures authorised user accounts with varying rights. The flexible schema accommodates additional fields for comprehensive data management at both product and item levels. Designed for large-scale data processing, ettos presently supports the apparel sector but is easily adaptable to include other similar product types. It serves both fashion brands and suppliers, enabling transparency and traceability across the global supply chain. Enabling direct consumer interaction through personalised experiences, ettos is committed to expanding transparency and traceability across the global supply chain.



Useful link:

www.ettos.io

FEDeRATED

CEF FEDeRATED Action (FEDeRATED)

FEDeRATED was an EU CEF project for digital co-operation in logistics which consists of 15 partners located in 6 EU Member States (Luxemburg, Italy, Finland, Netherlands, Spain, Sweden). However, the project is open to observer organizations that would like to contribute and join efforts to realize sustainable data sharing. The German Ministry of Transport and Digital infrastructure participates as an observer in the FEDeRATED projects. Within the context of testing data sharing opportunities on their feasibility business and public authorities are invited to participate in a multitude of national and cross-bordering pilots and living labs.

- Demonstrate how the federative platform as proposed by the EU Digital Transport and Logistics Forum (DTLF) can work.
- Identify the conditions (barriers and opportunities/benefits) that allow different stakeholders to make use of federated data sharing platforms.
- Facilitate seamless and cross bordering multimodal freight transport, cross bordering harmonized data interoperability, and data sharing between relevant actors.
- Enable paperless transport in all transport modes via concrete actions and large-scale collaboration.
- Support eGovernment, including a one-stop shop and only once reporting functionalities, and a corridor management information system approach.
- Develop a reference architecture for a sustainable data sharing environment.

Find more information at: http://www.federatedplatforms.eu/

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
	Level	Simple			Advanced		

IT architecture: Access control	**If advanced**	Attribute based	Role based	
IT architecture: Data use	Labelling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

The vision is to go from a monolithic data sharing platform perspective towards a federated network of platforms. Enabling all supply chain operators to connect, operating their own IT systems or platforms. In contrast to the traditional platforms which only access data that is within the database of their system, the federated platform aims to leverage on decentralized architectures in order to access any data anywhere in the world. Moreover, the adoption of semantic web technologies for linked data (RDF) enables a better representation of data and powerful querying capabilities.

Maturity level and application sectors

The maturity level is akin to the TRL 6-7 level. This means that FEDeRATED is applied and developed in several prototypes and different sectors but has no market ready product to offer.

The main purpose is the development of the foundations for a secure, open, and neutral data sharing infrastructure provision through practical Living Labs. The 15 FEDeRATED partners are executing 23 Living Labs/Pilots until the end of 2023. Living Labs are required to cover several modes of transport putting focus upon multi-modal concerns and events within (including a section of) a transport corridor. The Living Labs address the value of enhanced transparency, data sharing with a focus beyond a single organization, and encourage data sharing and collaboration among multiple parties along the transport chain.

FFBS ID

Fashion For Biodiversity

FFBS-ID, a hybrid digital product passport combining NFC and RFID technologies. This innovative solution enables fashion and lifestyle brands to track the journey of their products from farm to fashion. It uses geospatial data to visualise environmental and biodiversity impacts.

The primary objective of FFBS-ID is to create a digital passport that complies with the Green Claims Directive and Product Environmental Footprint (PEF) regulations. A key feature is the elimination of human intervention in data entry at the T5 (raw material origin) stage, ensuring an unbiased and transparent environmental assessment.

FFBS-ID's expertise in proof-based traceability and compliance with current and future supply chain legislation such as PEF, EUDR, EU Biodiversity Strategy and CSRD (ESRS E4). By adopting this digital passport, brands can authenticate their environmental claims, mitigate risk and contribute to biodiversity conservation efforts through responsible sourcing and informed decision making.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

FFBS-ID replaces the century-old process of determining the origin of raw materials (T5) based on self-reporting with space technology.

FFBS-ID harnesses the power of satellite surveillance, the Internet of Things and physical verification with hyperspectral drones, supported by the European Space Agency's Copernicus programme. We call this suite of technologies 'triangulation'.

This data is stored on the Hyperledger blockchain and analysed using AI tools (Random Forest, K-means, TensorFlow and Vision AI). Recurrent Neural Networks (RNNs), Convolutional Neural Networks (CNNs) models are used to extract the conventional, organic or regenerative nature of the farm or plantation in line with the Green Claims Directive, Product Environmental Footprint (PEF) regulations and the EU Biodiversity Strategy 2030.

Our user interface provides an interactive dashboard for fashion brands to access comprehensive farm-to-fashion or fashion-to-farm traceability insights.

Maturity level and application sectors

Technical Readiness in GREEN

The activity/milestone for the development of FFBS ID as a traceability tool in the fashion-tech sector is listed below in the table.

Activity/ Milestones	Hardware	Software	2023				2024 (Months)											
			Q1	Q2	Q3	Q4	1	2	3	4	5	6	7	8	9	10	11	12
IoTs	Yes	Yes																
Drones Services	Existing	Yes																
Satellite Services	Existing	Yes																
Isotopic Analysis	Required+	Yes																
FFBS- ID Dashboard@	Not required	Yes																
FFBS ID Static/AV	Not required	Yes																

FFBS ID VR	**Not required**	**Yes**																
FFBS ID Andriod/IoS Application	**Not required**	**Yes**																
NFC + RFID	**Not required**	**Yes**																
FFBS WASHABLE RFID	**Not required**	**Yes**																

Fluxy- GS1 Saas Platform

Fluxy - GS1 Saas Platform

Fluxy.one: European SaaS StartUp Driving Sustainability and Circular Economy Initiatives.

Fluxy.one is a pioneering project dedicated to advancing sustainability, circular economy principles, and data security across Europe. Our mission encompasses the comprehensive study and implementation of Digital Product Passports (DPP) and GS1 markings for EU manufacturers. Through our platform, we offer simple and efficient management of DPP, GS1 QR codes, dynamic links, and advanced analytics capabilities to meet the needs of manufacturers and merchants.

At Fluxy.one, we are more than just a technology service provider; we are advocates for sustainable development and environmental stewardship. Our commitment extends beyond digital solutions to minimizing environmental impact and actively supporting environmental initiatives throughout Europe. Join us in revolutionizing industry practices and fostering a more sustainable future for generations to come.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

Fluxy.one is an L5 and L4 Level solution. (Possibly L3).
We create one unified, harmonized supply chain that takes care of everything from unit-level serialization and global compliance network needs to close the last mile all the way to the person buying your product with Fluxy.one.

Maturity level and application sectors

The project is at the research and pilot development stage.
Work is currently underway on:

- A pilot project with a leading manufacturer of equipment for automating the recycling of used batteries is scheduled for 2024.
- In parallel, work is underway on a solution for e-commerce merchants.
- A SaaS platform for the SMB sector is also being developed, with test launches planned in the Nordic and Baltic countries and Poland for 2024-2025.

You can follow the project using the following links:

- https://fluxy.one
- https://www.linkedin.com/company/fluxy-one/
- https://twitter.com/fluxy_one

Useful links:

1. Digital Product Passport. DPP for Circular Economy - https://drive.google.com/file/d/1Y68jyWNkcqZ1FDGt4kvmtL8va1RSi75-/view?usp=sharing

2. Supply Chain Processes & Participants - https://drive.google.com/file/d/1_6LSZaK0cNdRCVYpZRC5h62eqJg4sCY5/view?usp=sharing

3. Fluxy.one increases transparency security & trust - https://drive.google.com/file/d/1LP_2Tk0moI1C_EPS-62dQ_tsrTvBLyoS/view?usp=sharing

4. Fluxy.one Meta - https://drive.google.com/file/d/1AV3EIgYGOEKJDg_SJJpQV1655hfuWbkS/view?usp=sharing

5. Fluxy.one Logo - https://drive.google.com/file/d/1o7L3fV0bHNGkZ7AKZ7Jv0KJXNkmXYZPg/view?usp=sharing

GTS

Global Textile Scheme (GTS)							
Developed by a cross sectoral industry initiative of material suppliers, brands, retailers and IT companies (ERP). The develop a unique end-to-end data exchange standard for textile value chains with "Mapping function" (current data worlds can remain the same).							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier		Yes		No		
	Resolver		Yes		No		
Digital connector	**ID minting**		Centralized		Decentralized		
	Data storage location		Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging		Data transfer		API		
IT architecture: Access control	**Level**		Simple		Advanced		
	If advanced		Attribute based		Role based		
IT architecture: Data use	Labelling		Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**		Blockchain		Verifiable Credentials		Others
	Convenience		Wallet		Data Ports		Others
	Data protection		PETs		Anonymization		Others
	Traceability		Tagging (QR, NFC, RFID)				Others
Unique technical aspects							
USP: Pulling data concept, like an online bank statement. Covering data from fiber to circularity. Technical implications: (1) catalogue with clear semantics and; (2) encoding each of the data in the							

catalogue for multilingual features. Today the system is based on article – colour – size (Stock Keeping Unit = GTIN) but could be extended to article – colour – size – production order - lot.

Per user only onetime translation/mapping process per product class, therefore reduced interface complexities.

Maturity level and application sectors

Maturity level: Complete for today's needs.

GoodsTag GmbH Smart Products Platform

GoodsTag GmbH Smart Products Platform
With a unique digital ID for each product, our platform enables context-driven services, enhances management and tracking capabilities, and ensures unparalleled brand security. From source-tagging to label printing and personalized customer activation, GoodsTag Smart Products platform covers every aspect of your product journey. The platform provides user-friendly real-time management and analysis tools for every stage, from production and warehousing to in-store and at-home experiences. Gain complete visibility into the product life cycle, down to the individual item, and enjoy unmatched end-to-end control. By harnessing the power of smart products, you can transform them into real-time media channels. Forge deeper customer and brand relationships through personalized and meaningful product interactions. GoodsTag empowers you to deliver the perfect experience at precisely the right moment, fostering loyalty and engagement.

Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others	
	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
	If advanced	Attribute based		Role based		
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		

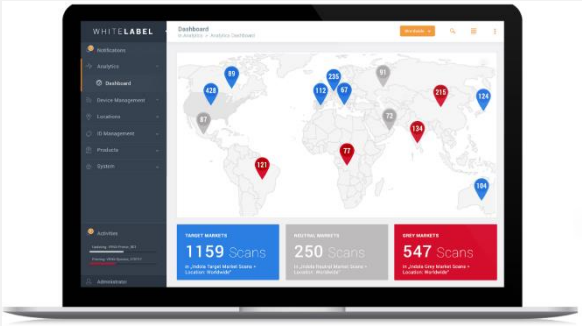
	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

The GoodsTag Smart Products Platform is built on the base of an API-first microservice infrastructure, it seamlessly integrates with various systems and applications, enabling effortless communication and data exchange. The platform is ID agnostic, accommodating multiple identification methods and standards such as RFID, NFC, QR codes, and more. It also supports handling IDs at any level, whether it's SKU, batch/lot, or single item, providing granular control and tracking capabilities. GoodsTag is trigger technology agnostic, allowing seamless integration with different trigger technologies like various RFID readers and mobile devices. This versatility ensures that your smart products can be activated and interacted with through the most suitable means for your business. Adhering to GS1 standards, including the early adoption of the GS1 Digital Link standard, GoodsTag ensures compliance and compatibility with global best practices in product identification and data management. This standard unlocks opportunities for richer product information, dynamic interactions, and extended functionalities through web links associated with product identifiers.

Maturity level and application sectors

The GoodsTag Smart Products Platform is a mature and robust solution that has been developed and refined to meet the diverse needs of various application sectors. With a proven track record and experience in the industry, GoodsTag offers a high level of maturity in terms of technology, functionality, and reliability. The platform caters to a wide range of application sectors, including retail, manufacturing, fashion, FMCG, healthcare, and more. GoodsTag enables enhanced inventory management, personalized customer experiences, and improved supply chain visibility. With its flexible and adaptable nature, the GoodsTag Smart Products Platform can be tailored to meet the specific requirements of various sectors, making it a versatile solution for companies across industries. The platform facilitates traceability and real-time tracking as well as monitoring capabilities of diverse products. GoodsTag's maturity level and its applicability to diverse sectors make it a trusted and reliable choice for businesses seeking to digitize their product lifecycle, enhance operational efficiency, and provide exceptional customer experiences.



Useful link:

https://www.goodstag.com/platform/

Infinite X

Infinite X
At Infinite X, we are building a closed loop system. It has three layers i.e., DPPs, Reverse Logistics and Partnerships. With DPPs we collect maximum possible information about the product from the brand and utilise this to route the product to the right partner at the right time at least cost. Partners here are recyclers, upcyclers, NGOs for donation, resellers, etc. We integrate DPPs with clothes during their manufacturing stage. We are primarily operating on heat seal taffeta based QR code labels and NFC chips. Currently we are limiting ourselves to fashion categories including bags, footwear, garments and accessories. We are primarily operating in India.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Our DPPs are granular to item level. For easy handling of information at a granular level, we have categorised common information in sets like style, commerce. While onboarding, we copy them across items.

We do not operate on any external stimuli-based event flow as of now. For example, we don't know whether a customer has bought a product or not until they register their purchase by themselves.

Our database simply works on a hub and spoke model where the hub is a unique product and spokes are different data sets associated with it. These data sets are modifiable as we move ahead with more products and types of partnerships.

Maturity level and application sectors

We have onboarded 1200+ products of 4 brands and 1 marketplace till now. An TRL, we are at level 7 i.e., System model or prototype demonstration in an operational environment.

Our application areas include garments, accessories, bags, and shoes.

Useful link:

https://infinitex.in/products/InfiniteX100003746

Internet of Traceability

Internet of Traceability
TrackVision AI provides SaaS products to help companies leverage open GS1 standards for traceability. We believe the most cost-effective approach to implementing DPP is through an "Internet of Traceability", based on open GS1 standards, that can be traversed programmatically, and consists of web-enabled products that reference each other. This reduces system integration costs between participants to almost zero, while being completely decentralized and vendor neutral. TrackVision AI provides cost-effective software for suppliers to participate in; however, our solution is interoperable with any vendors that support the standards. TrackVision AI also provides software for downstream buyers of goods to dynamically query and monitor the traceability data of the products they receive. The underlying data provided by the supplier network can be leveraged for further benefit beyond DPP compliance, such as scope 3 carbon emission calculation, or upstream certification monitoring.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	NFC
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID, GS1)		Others
Unique technical aspects				

HOW IT WORKS: Each supplier hosts a web address for each item/batch they manufacture, using the GS1 Digital Link standard. These web addresses return human readable data as normal in a web browser, but when queried with a special "traceability" URL parameter (using the "linkType" feature of Digital Link standard), they return machine-readable traceability data in GS1 EPCIS 2.0 format.

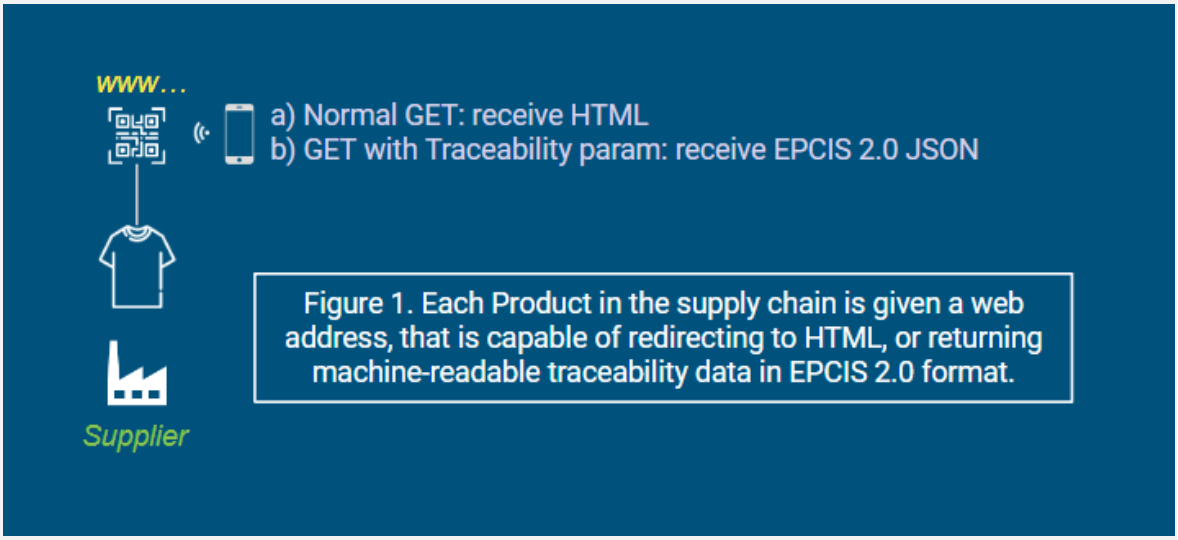


Figure 1. Each Product in the supply chain is given a web address, that is capable of redirecting to HTML, or returning machine-readable traceability data in EPCIS 2.0 format.

The responses reference Digital Links of input material in the manufacturing process, forming a tree data structure that can be programmatically traversed by client software of downstream parties that need this information.

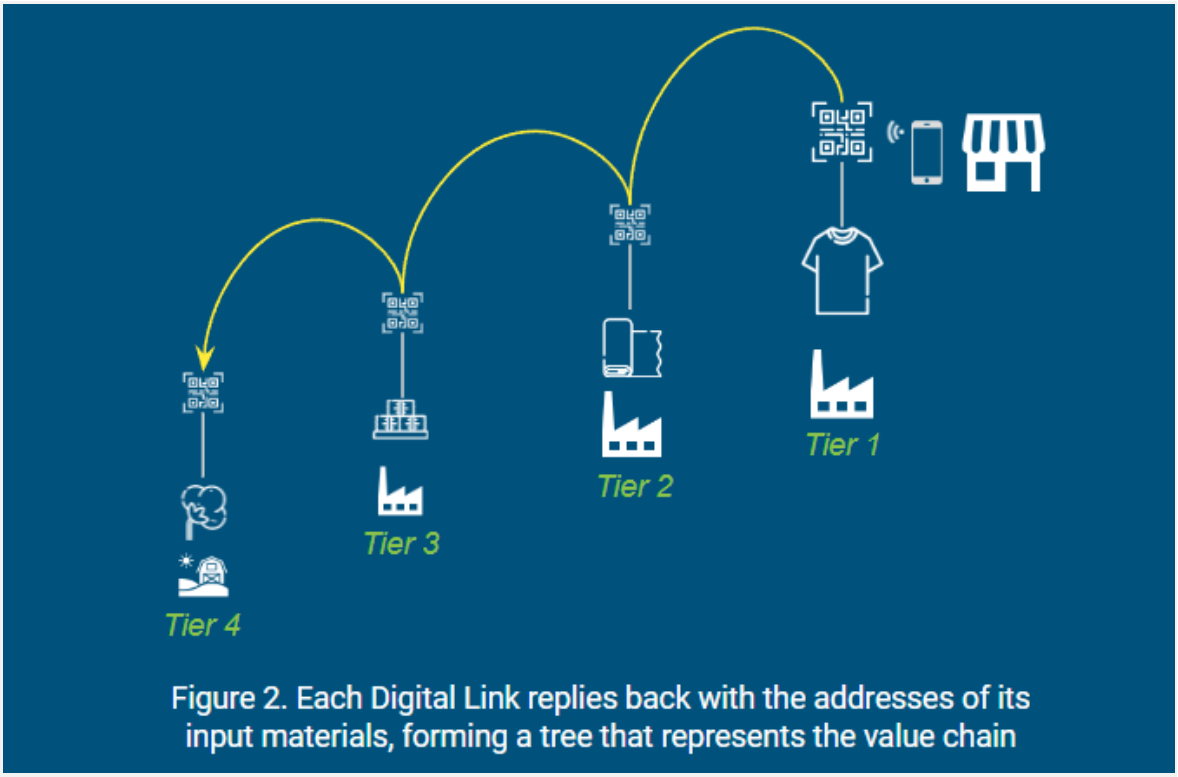


Figure 2. Each Digital Link replies back with the addresses of its input materials, forming a tree that represents the value chain

With this approach, a goods receiver that knows the Digital Link address of an item can query and reveal unlimited tiers of supplier input material, without any special system integration to specific parties. Product/location master data can also be fetched dynamically via Digital Link. The data can be formatted for consumers or used for automatic monitoring and reporting at scale.

Maturity level and application sectors

This approach is based exclusively on mature GS1 standards: GS1 General Specifications (GTIN, Lot, Serial, GLN), GS1 Digital Link, GS1 EPCIS 2.0, and GS1 Web Vocabulary. No proprietary data formats are used, guaranteeing interoperability and decentralization.

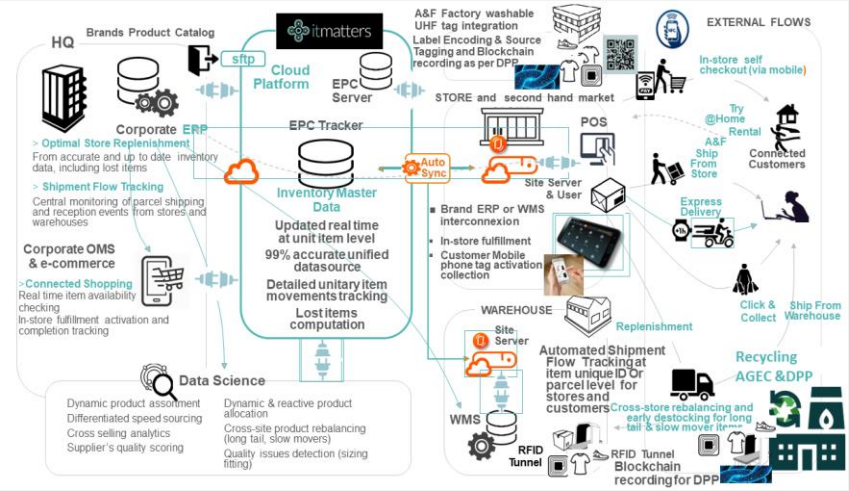
Communication protocols involved are the same mature, well understood and scalable technologies that give us the everyday internet: web servers, TCP/IP, HTTP, JSON.

It is applicable to any industry and any manufacturing process.

TrackVision AI has a fully operational implementation of the “internet of traceability” that enables suppliers and commercial buyers to fulfill DPP requirements in a cost-effective and open way.

itmatters

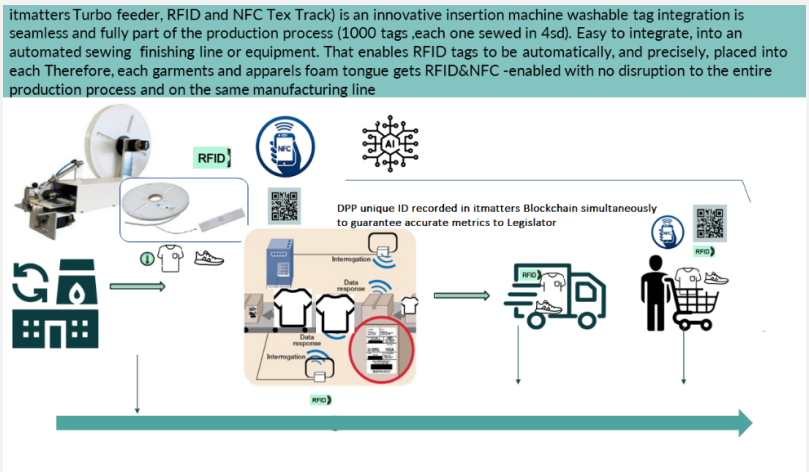
Itmatters							
Unique Cradle to Grave 4.0 garment and footwear traceability solution.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	NFC
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID, GS1)			Others		
Unique technical aspects							
Itmatters data Mesh cloud S.A.A.S Platform today has 1 billion connected objects capacity and provides the following information to brands & manufacturers, end consumers and governments administrations.							



Itmatters technical solution: Itmatters provides a unique Cradle to Grave traceability 4.0 Solutions to propel retail brands in their digital transformation journey towards circular economy with powerful Direct to Consumer Engagement.

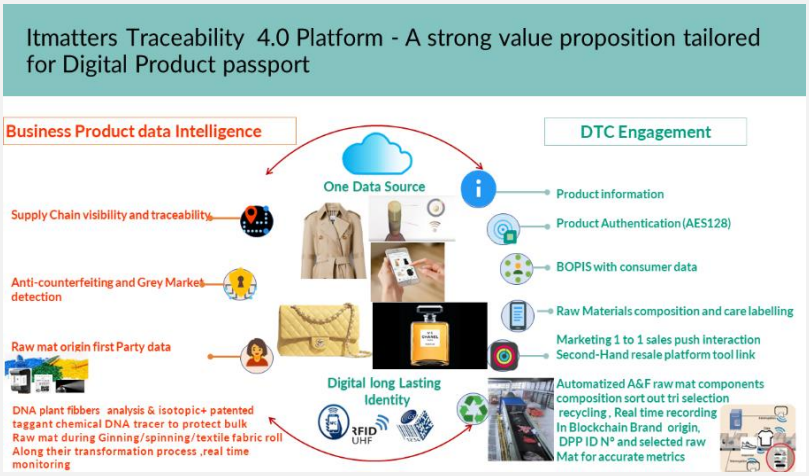
At itmatters we: Support brands & the raw material industry in D.N.A. analysis of plant fibers, (organic or fertilized, including % of purity) and an isotopic analysis to determine the geographic origin (an answer to Uyghurs Cotton & consumer concern). Itmatters supports brands & the raw material industry in tracking and authenticating every raw material origin with **itmatters By Olnica** a patented taggant chemical DNA tracer, harmless, odorless and easily readable with a mobile app. A solution, based on IoT Smart Tags, a cloud platform and a branded customised webapp for a proper Direct to Consumer Engagement. A range of long lasting soft washable tag UHF or BI techno (UHF & NFC) embedded in any garment or apparel to fit any product which supports our recycling automatised processing of raw material component composition sort out.

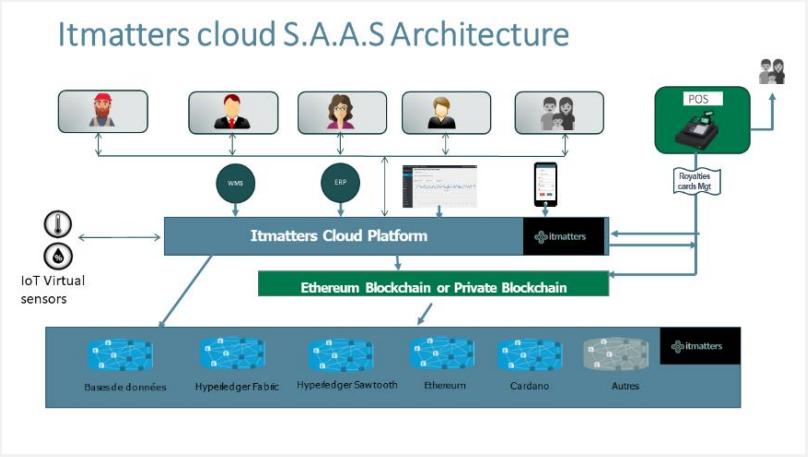
Please see all technical features related to Garments and shoes smart tag:
https://1drv.ms/x/s!AuG5tIk70Dt7g84TL6Ho1YTgllvCFw?e=42rkPU

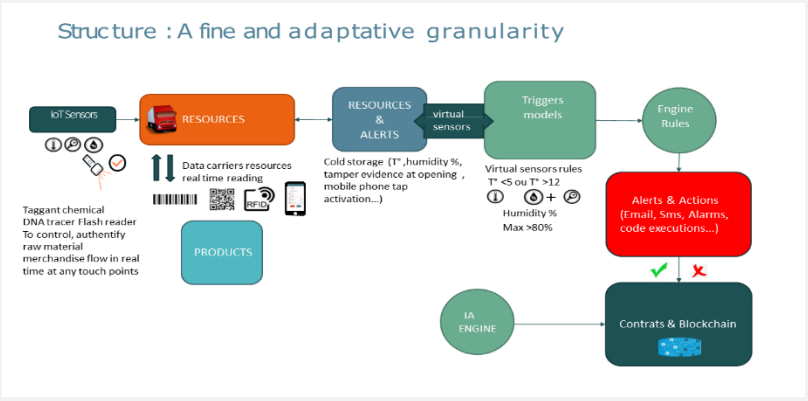


Agnostic Data Mesh SAAS CLOUD Platform interoperable with any data carrier (UHF, RFID, NFC, GS1 digital Link, QR Code, Datamatrix, Bluetooth, Lorawan, Sigfox). Itmatters platform has

Blockchain Ethereum and a private Blockchain, an AI tool, and an impact calculator tool under the EU PEF method (Product Environmental Footprint).







Maturity level and application sectors

The 4.0 solution is flexible and can be used with any existing IT environment. Tags are ready including the washable 3 cm soft UHF tag and the 7 cm bi techno UHF& NFC tag to support large production over 1 billion manufacturing capacity.

We have a cloud platform build on two engines; an IoT engine which records in real time any data carrier information from Cradle to Grave, and a predictive engine (AI) device set: to alert, to anticipate, to take action regarding merchandise flow traceability. Finally, our customised mobile phone is made with Progressive Web App technology, a powerful solution for businesses looking to improve their online presence and user engagement. It gives users an app-like experience that works on any device or platform. This includes a user interface that is smooth and easy to use, as well as the ability to work offline. PWAs can provide offline support, which allows users to access the app even when they don't have an active internet connection.

Useful link:
https://itmatters.fr/

Kezzler

Kezzler
Kezzler enables brand owners to build sustainable value chains through its Connected Products Platform. The platform is used to collect, structure, and share traceability data 'AT SCALE'. Massive product volumes are handled with flexibility and at speed. To comply with Digital Product Passport requirements, the Connected Products Platform allows brand owners to: 1. Digitize their products by providing a digital identity. 2. Collect all relevant data linked to a product's journey, all in one place. As products are travelling throughout the Value Chain there are multiple interactions and events, thus forming a product journey (or an item cv) that is being built. 3. Important is the ability to provide opportunities for dynamic interactions with a variety of users through the Digital Product Passport (Warehouse Managers, Prospects, Customers, Inspection agents, Repair Services, Recycling companies, …. or other IT systems). The Connected Products Platform enables these dynamic interactions

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

While building a platform that prioritizes interoperability using standards-based integrations, Kezzler has ensured scalability and flexibility by developing proprietary technologies related to serialization, traceability data compression and data management. Our IP results in a reduction in the complexity of the repository required, reduces overall data processing requirements and the latency associated with large-scale track & trace.

In particular, the Kezzler Connected Products Platform provides:

- The ability to create and manage vast volumes of cryptographically secure UIDs
- Proprietary compression technology for long-term data storage of events data and rapid query response simultaneously
- Scalable and flexible API Integration Gateway for unmatched ease of integration
- Security first approach with multi-layered security to ensure only appropriate access to data via Role Based as well as Object Based access control
- ISO 9001 certified, GDPR and ISO 27001 compliant

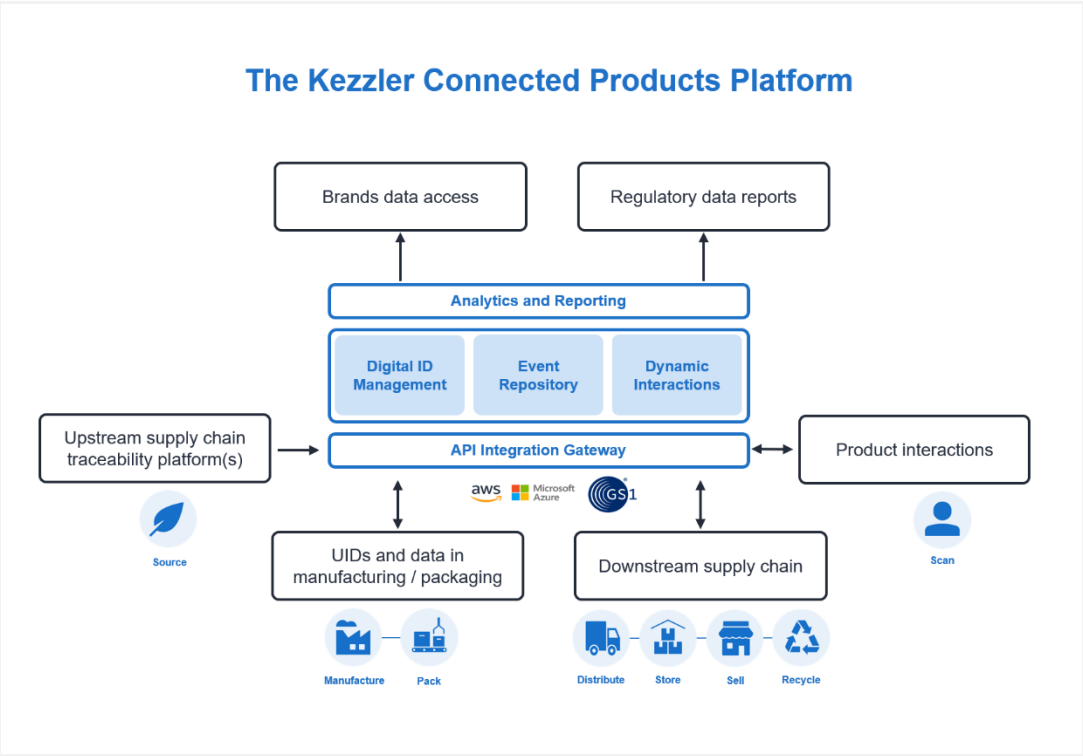
Maturity level and application sectors

Kezzler is an independent company with 20 years' experience in implementing its Connected Products Platform as its only core business, headquartered in Norway with subsidiaries in the Netherlands, USA, India, Singapore, and China. Kezzler has a mature global partner network as well as being backed by solid industrial investors.

Recent experience of dedicated client instance deliveries at scale:

- Handling an annual addition of 5+ billion items into a single client's environment.
- Handle 2+ billion EPC identifiers annually in a scalable EPCIS 2.0 repository.
- Handling multi-million daily API calls for a single client.
- Track and Trace system spanning multiple software instances including across the Chinese firewall.
- Integrating 5000+ Point of Sales systems, as well as over 20 integrations towards other parts of their IT landscape.

Application Sectors: Textile, Electronics, Furniture, Cosmetics, Batteries and/or any products manufactured at scale with a complex Value Chain.



Useful link:

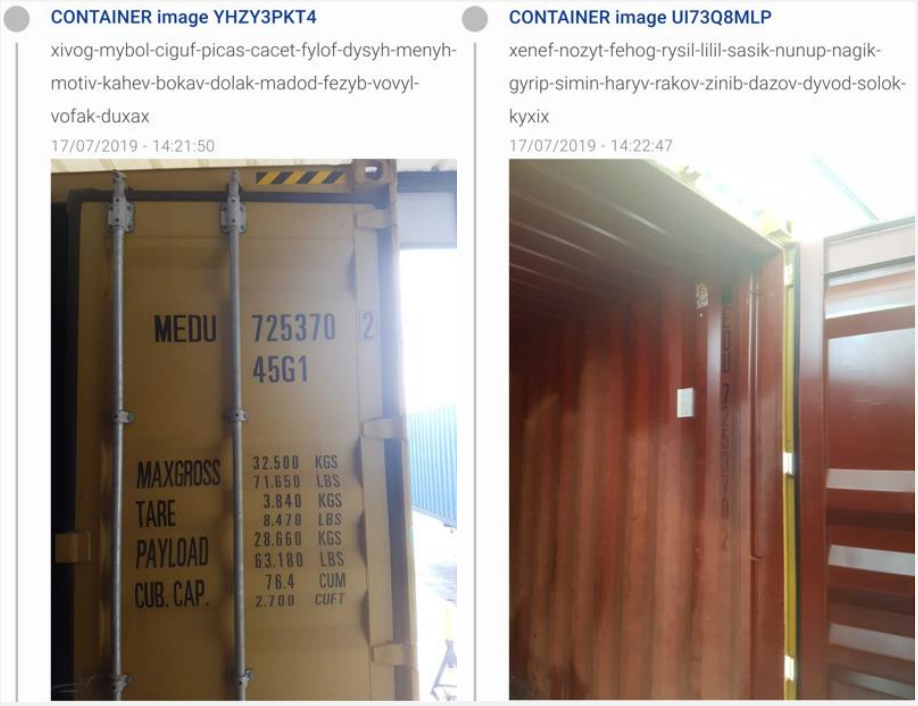
www.kezzler.com

Log Data Hub

Log Data Hub

Log Data Hub is a solution that enables companies to create digital product passports for goods, parcels, or containers, with a focus on the supply chain and carbon footprint.

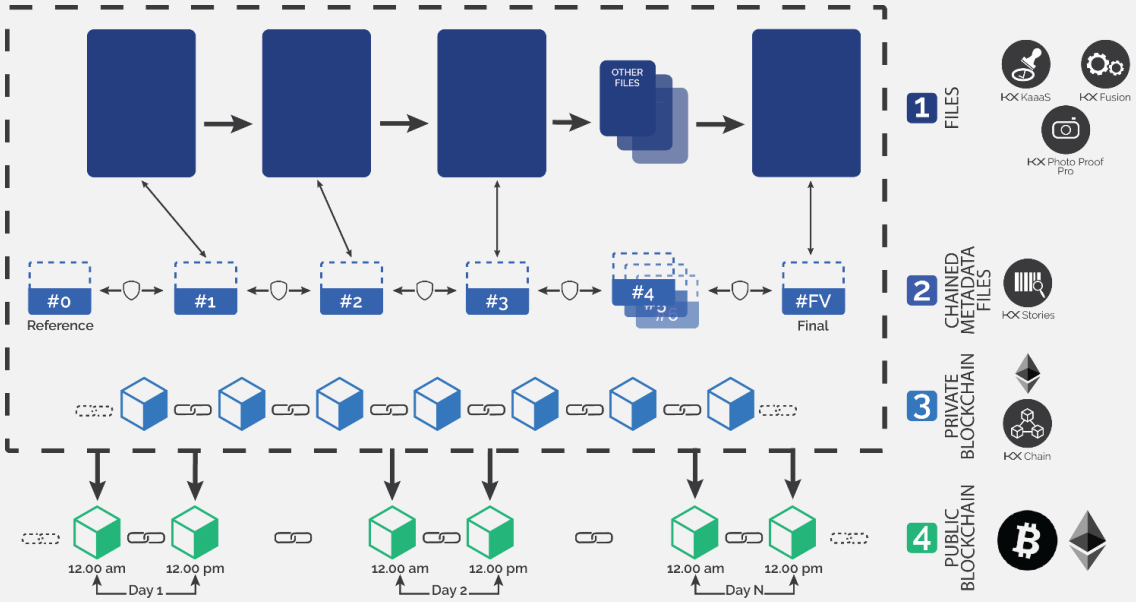
The history of a product can be completed with elements from the owner or third parties for optimal traceability. The solution encourages the extension of a product's life and allows to really enter the circular economy.



Mapping with respect to the reference framework							
Product ID	**Type**	Instance				Category	
	Granularity	Model		Batch		Prod. order	Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes				No	
	Resolver	Yes				No	
Digital connector	**ID minting**	Centralized				Decentralized	
	Data storage location	Centralized				Decentralized	
IT architecture: Data transport	**Openness level**	Standardized		Proprietary		Data ports	Others
	Data packaging	Data transfer				API	

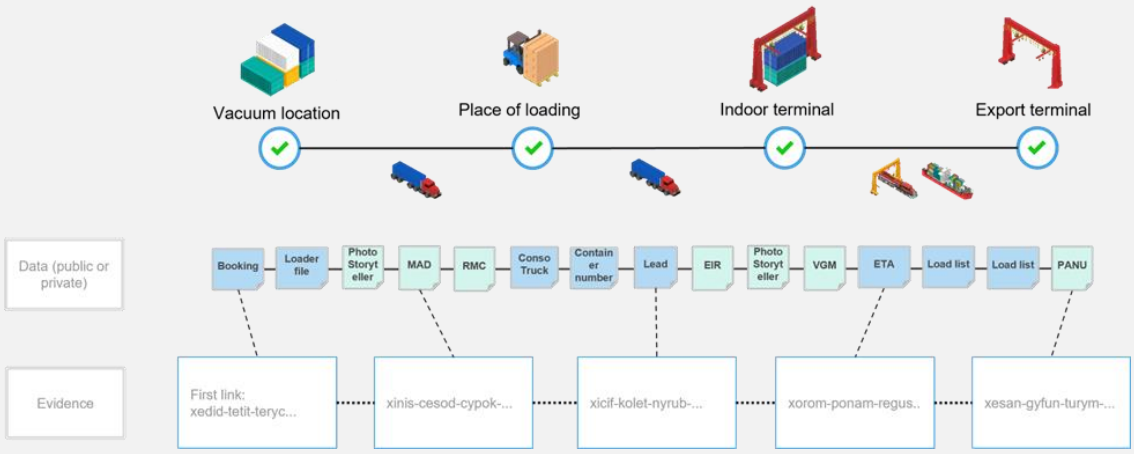
IT architecture: Access control	**Level**	Simple		Advanced
	If advanced	Attribute based		Role based
IT architecture: Data use	Labelling	Enforcement		Others
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others
Unique technical aspects				

Log Data Hub is based on KeeeX Stories, a universal framework developed by KeeeX to track and trace any product using navigable chained metadata files whose sequence can be traversed from end to end. It allows to record evidence related to the history of a specific product or process (events, information, documents).



The solution guarantees the confidentiality and security of the data: it records only the traces and leaves the files to their owners. Each trace is linked by a unique identifier to a protected, signed, time-stamped, provable, and verifiable file.

The tool allows you to record an event on one or more traceability chains with the ability to trace from batch to unit. An open-source repository of json schemas ensures the interoperability of information. The main industrial data and exchange standards are supported: REST-API, GS1 EPCIS, Digital Link, SSI.



It is also possible to use the Photo Proof Pro mobile app to add photo or video evidence to a product story.

Maturity level and application sectors

The solution is used in production since 2019 and KeeeX has been developing digital evidence and traceability solutions since 2014.

The main applications sectors are industry, supply-chain, luxury and cosmetics, agrifood.

Useful links:

KeeeX & Supply-Chain: https://www.youtube.com/watch?v=IynUtCz-oTI

KeeeX technical properties: https://keeex.me/wp-content/uploads/Note-on-KeeeXs-properties-keeexed-xusos-tolaf.pdf

Loopcycle

Loopcycle
Loopcycle is a digital platform that connects manufacturers and operators to trace, manage and recover commercial equipment across its lifecycle, unlocking latent circular and commercial value. Loopcycle provides a lifecycle solution using three products: 1. A product tracker, enabling manufacturers to embed traceability at industrial scale from the point of manufacture. 2. A digital inventory for operators of commercial equipment to effectively track, trace and manage their equipment across multiple sites. 3. A resale marketplace through which operators can obtain maximum value through traceable exchanges with other platform members, or recovery of unwanted equipment by the product manufacturer. Loopcycle builds a digital ecosystem that provides customer intelligence and asset management resource recovery with profiling data to measure embodied carbon. With the adoption of DPP regulation, Loopcycle can help organizations stay compliant, competitive and on track for Net Zero goals.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Of aspects related to DPPs, the Lifecycle Tracker is most relevant. It ascribes a digital identity to every product baked into the blockchain. As an entity changes ownership or state throughout its lifecycle, the platform detects the change and encodes it as an immutable transaction. The provenance of any identifiable asset can be presented by simply scanning a QR Code or NFC.

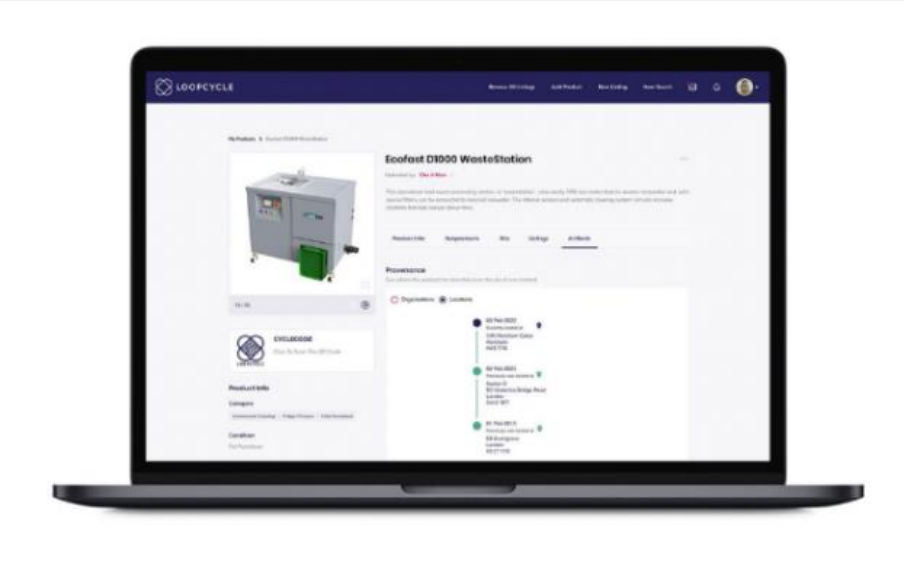
As it enters the platform, an AI model powered by machine learning automatically detects the specifications of the product and registers it to the platform. Another model detects the manufacturer and builds a link back to them. Owners of the product can then interact with the manufacturers of the product or relevant service partners via an MQ Telemetry Transport (MQTT) based messaging system for warranty, maintenance, and recovery.

This then creates a digital inventory for all parties, which harnesses the power of the blockchain for security, privacy, and immutability.

Maturity level and application sectors

Loopcycle is a commercialised product, working in a live environment at TRL9. Our platform has been successfully applied to manufacturers and operators in the commercial catering equipment sector. As a two-sided platform, we connect manufacturers of commercial equipment on one side, with operators of this commercial equipment on the other – with operator segments broken down into healthcare, education, hospitality, and commercial real estate.

Through our healthcare operators we have identified potential soft landings into new manufacturing sectors, with early validation in the medical equipment sector and exposure to companies like Medtronic, Johnson & Johnson and Philips. Whilst we have targeted specific sectors in which to land and expand, Loopcycle is applicable to B2B sectors in which intermediaries exist and manufacturers want to better understand their products, and where operators have a need to better understand the equipment that they have across several locations.



Useful links:

loopcyle.io

https://www.linkedin.com/company/loopcycle/

LUKE AG

LUKE AG							
LUKE is a solution for removing and digitizing care labels on textiles. It consists of two components: the LUKE handheld device removes the labels from the clothing item without leaving any residue using a thermal cut (this method is patented). The second part of the solution is an app that digitizes the information on the labels and makes it available to users for various applications. The Digital Product Passport is also taken into account in this process.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

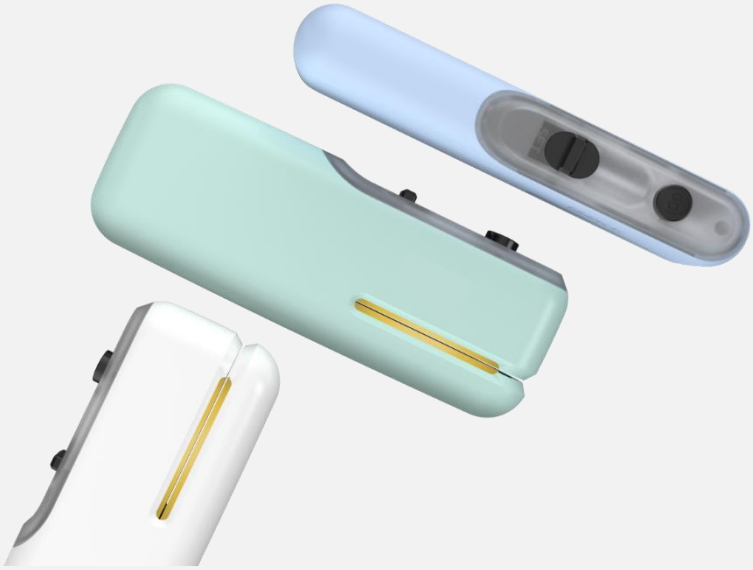
Unique technical aspects

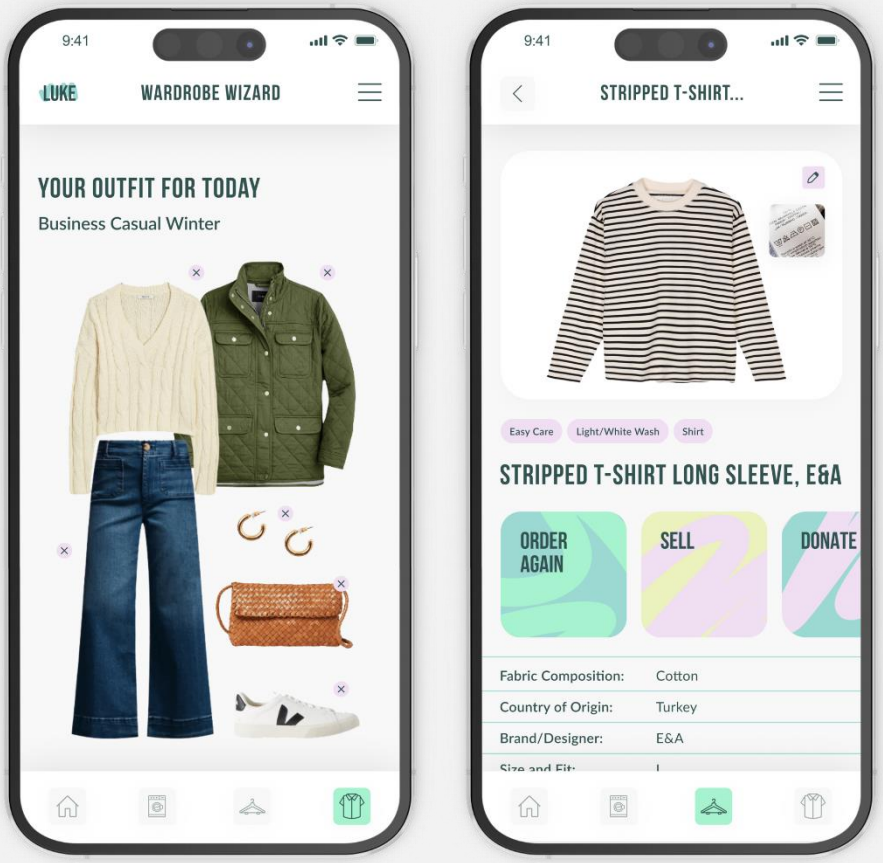
The handheld device is the first solution worldwide that removes care labels and seals the cut edge simultaneously. The app serves as the starting point for a circular fashion ecosystem, gradually involving all stakeholders in the value chain of textiles.

The DPP plays a special role in this regard. It provides the foundation for data-driven collaboration among stakeholders and offers users maximum transparency to enable more sustainable handling of their clothing.

Maturity level and application sectors

LUKE will be launched on the market by the end of 2024. Rapid scaling is planned for Europe initially, followed by expansion into the USA and Asia in 2025.





Useful link:

https://luke.swiss

LW3 - Phygital Product Passport (P3)

LW3 - Phygital Product Passport (P3)
LW3's P3 solution revolutionizes product authenticity on Algorand public blockchain (a Layer 1 blockchain with Block finality of < 3 seconds and throughput of 10,000 TPS) for fast, transparent, and immutable product passports, accessible via a smartphone app. It combines encrypted physical identifier - NFC tag to ensure secure, clone-proof verification for consumers on both Android and iOS platform. LW3's P3 enables industries to generate a unique 'Product Passport' against their goods and end-consumers can verify the passport with a smartphone application. The P3 application suite is designed to capture Upstream, Midstream & Downstreamn trace points of the product value chain. It can integrate geo-location, time-stamp, image, video, etc. in any trace point thereby proving a comprehensive traceability solution. The solution also extends to enable CRM 3.0 capabilities to the users with integration of Natural Language Processing (NLP) and Gen AI.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

Some of the unique technical aspects of LW3 P3 solution are:

1. Bulk cloning protection - Creates unique encrypted data for a particular product and its corresponding Physical Identifier (PI). This encrypted data in the PI is validated during authentication by the smartphone App to verify if the data belongs to the PI. It provides a robust layer of security for PIs encoded with the LW3 traceability system.
2. Multichain support capabilities - The passport system can be customized to support multiple blockchain unlike other solutions in the market. Currently LW3 supports - Algorand network.
3. The traceability data is stored on IPFS offering versatile blockchain solutions tailored to businesses, ensuring seamless integration and efficient scaling.

Maturity level and application sectors

In 2023, LW3 was founded with a clear mission: to enhance the integrity of consumer products by enabling advanced traceability and provenance, thereby addressing the pressing challenge of counterfeiting. This mission led to the development of the P3 Solution, a sophisticated Mobile Authentication Solution that swiftly gained traction across markets in need of reliable security measures.

LW3's P3 solution was the winner of Global Algorand Impact Summit 2023 organized by Algorand Foundation for creating real impact lauding it to be a transformative blockchain-based solution in India. With a client base spanning diverse industries such as wine & spirits, pharmaceuticals, spices, tea, handicrafts & handlooms, and medical devices, LW3 has established a formidable track record.

Useful link:

https://shorturl.at/wFJMX

Lynx Technologies

Lynx Technologies
Lynx is an advanced traceability platform that seamlessly integrates, verifies, and harmonizes data across every link in the supply chain. From sourcing raw materials to recycling processes, our platform delivers a comprehensive and near real-time visualization of a product's entire lifecycle. With a core focus on supply chain data integrity, privacy by design, and data interoperability, Lynx ensures accuracy while providing a single source of truth for your business operations.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
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Digital connector	**ID minting**	Centralized			Decentralized		
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	Convenience	Wallet		Data Ports	Others		
	Data protection	PETs		Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

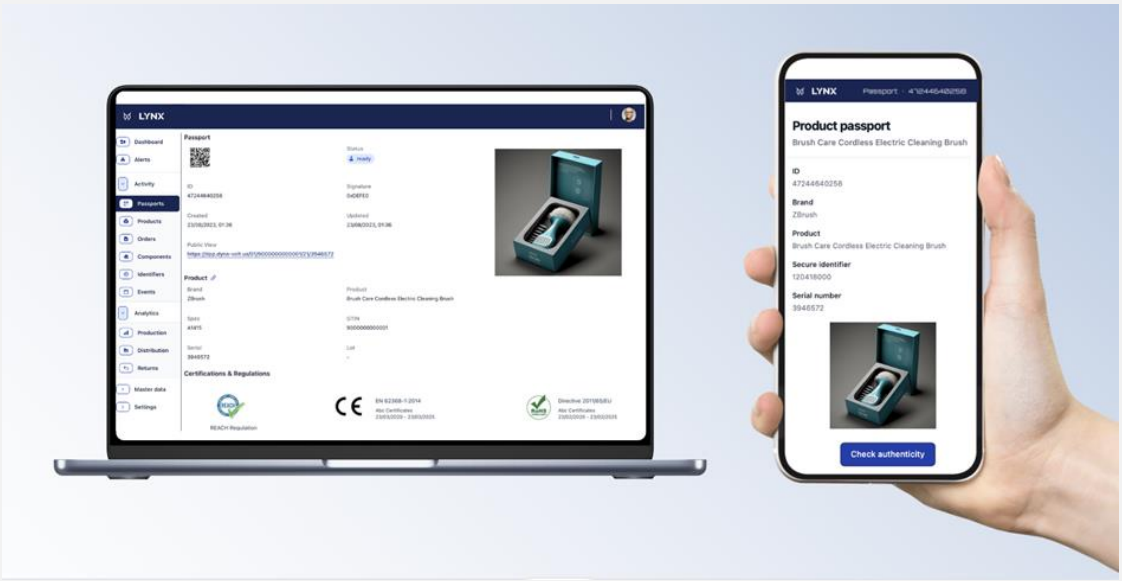
Lynx Platform was designed with the goal of being a cloud-native, vendor-agnostic event store architecture that prioritizes scalability, flexibility, and cost-efficiency.

1. **Vendor-agnostic:** Our architecture is designed to be agnostic to the cloud vendor, allowing us to choose the cloud that best meets our needs.
2. **Scalable:** Our event store architecture is designed for scalability, allowing the platform to grow as business expands.
3. **Flexible:** Our architecture is flexible, allowing it to adapt to changing business requirements and keep pace with rapidly evolving businesses.
4. **Cost-efficient:** The use of well-known off-the-shelf components provides a cost-efficient solution that prioritizes performance.

Maturity level and application sectors

Lynx Platform comprises an analytics dashboard that enhances value chain visibility at the component level, alongside with a Digital Product Passport module ensuring compliance with emerging regulatory frameworks. Currently standing at TRL 7(integrated pilot system demonstrated) and having undergone rigorous testing, Lynx primarily manages batteries and electronic devices. It verifies and validates product data and certificates, subsequently generating unique DPPs throughout the product's lifecycle.

Application Sectors: Electronics, batteries, chemicals, cosmetics, and other products manufactured at scale.



Useful link:

www.lynx.swiss

MadeBy

Madeby							
Madeby is an API-first Digital ID solution focused on use cases of transparency, product impact, circularity and regulatory compliance. Built with interoperability at its core, Madeby aims to integrate with as many ecosystem providers as possible to create interconnected, more circular products.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling			Enforcement			Others
IT architecture: Data mgmt features	**Evidence**	Blockchain			Verifiable Credentials		Others
	Convenience	Wallet			Data Ports		Others
	Data protection	PETs			Anonymization		Others
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Madeby is designed to be able to ingest data via API or other data feeds from as many data sources as possible in order to avoid duplication or errors, and to share data with ecosystem stakeholders (eg resellers, repair, sorters, recyclers, customers, regulators) securely on a 'need-to-know' basis.

Our main use cases are transparency, product impact, circularity and regulatory compliance.

While Madeby is built with scalability in mind, it's low-barrier, low code approach makes our solution accessible to SMEs, promoting product digitisation regardless of company size.

* examples only

Maturity level and application sectors

Madeby is a young startup backed by Innovate UK developing an API first solution to digitise products, initially focused on the fashion industry, followed by consumer electronics.

Minespider

Minespider AG

Minespider AG is a technology company that has developed its own blockchain solution and set of tools for digital traceability of raw materials and products that can be applied starting at any point in the supply chain.

Its product portfolio includes:

- Product Passports
- Battery Passports
- Tracking tool
- Regulatory templates for ESG and DD and
- Carbon tracking

The digital passports can collect all the necessary data for communication between supply chain participants and provide blockchain access to it with a simple QR code. Minespider's solutions are adaptable to any type of entity or regulation across the supply chain, from large OEMs to artisanal miners.

By leveraging their blockchain-based platform, Minespider enables immutable and secure records, supporting transparency and helping businesses become more responsible and carbon neutral.

Companies can track their entire products' lifecycles and make more informed decisions based on data benefiting their performance and the environment.

Mapping with respect to the reference framework							
Product ID	**Type**		Instance		Category		
	Granularity		Model	Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier		Yes		No		
	Resolver		Yes		No		
Digital connector	**ID minting**		Centralized		Decentralized		
	Data storage location		Centralized		Decentralized		

IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others
	Data packaging		Data transfer		API
IT architecture: Access control	**Level**		Simple		Advanced
	If advanced		Attribute based		Role based
IT architecture: Data use	Labelling		Enforcement		Others
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others
	Convenience	Wallet	Data Ports		Others
	Data protection	PETs	Anonymization		Others
	Traceability	Tagging (QR, NFC, RFID)			Others

Unique technical aspects

Minespider has developed a public-permissioned blockchain, that gives companies secure blockchain access to their products' data with a simple QR code thus providing end-to-end traceability and scalability. These are some of the technology advantages:

- **Blockchain:** Minespider is the only company that uses a permissioned-public blockchain, developed in-house. At the same time, because of its PoA consensus mechanism, it keeps energy use at an absolute minimum.
- **Data Structure:** a three-layered data structure, where the user can decide individually. This allows for a balance of transparency and privacy, safeguarding companies 'confidential data.
- **Integration and interoperability:** Minespider has its own API and is blockchain agnostic hence can provide for faster scalability.
- **Multiple Industry focus:** the solutions can be applied and adjusted to multiple sectors.
- **Flexibility:** it allows for integration of additional standards/metrics making it fully adaptable to the changing regulatory environments.

Maturity level and application sectors

The Minespider solutions have been developed and are successfully applied across various sectors, predominately mining and metals, the electronics and battery related sectors.

The Minespider Battery Passport and our latest addition the Open Battery Passport (currently V2 prototype) can be subject to refinement based on the upcoming implementation acts that will be coming out of the recently adopted EU Battery regulation.

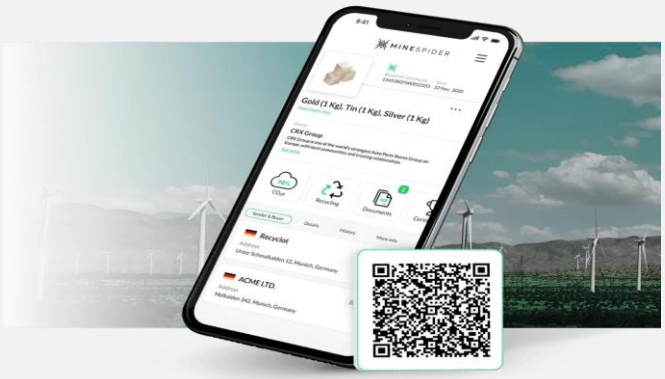
However, Minespider's Battery Passport V1 is functional and already in use across the different EU funded battery related project that Minespider is part of, such as the **BATRAW** project.

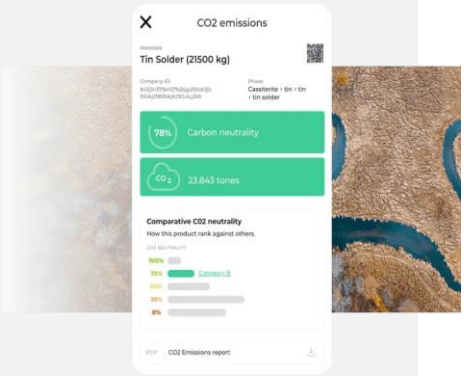
List projects and sectors in which this can be applicable:

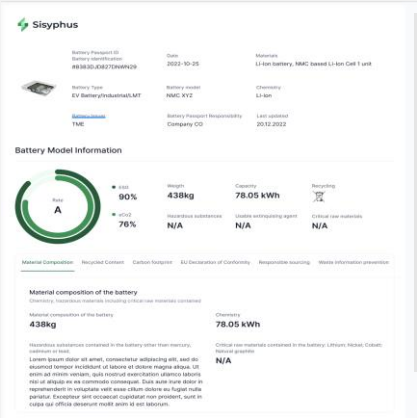
Some of our publicly announced projects include:

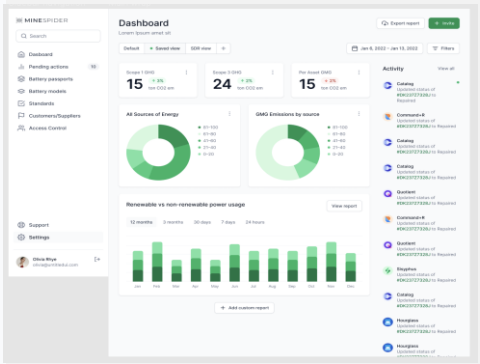
- BATRAW
- Recirculate
- Raw Materials Radar (RMR)

Sectors in which the solution is and can be applicable: Metals and Mining industry; Electronics industry; Battery industry; Recycling; Textiles; Plastics etc. The Minespider solutions can be applicable to any type of sector and/or industry.









Useful links:

https://www.minespider.com/

https://www.openbatterypassport.com/

https://www.minespider.com/press/european-commission-finances-a-10-million-euro-project-to-create-a-new-process-for-recovering-critical-raw-materials-from-electric-vehicle-batteries

https://www.minespider.com/press/the-eu-funded-project-recirculate-to-create-new-business-models-for-repair-reuse-and-recycling-of-second-life-batteries

Octo + iWay

Octo + iWay
Frequentiel assists Retailers and Brands to mark and track products. For this purpose, the company developed a software platform named OCTO+. • OCTO+ helps retailers to improve traceability, stock accuracy, logistics efficiency and customer engagement. • OCTO+ is available in Europe, North America, and Middle East. • OCTO+ Retail is widely used by retailers in warehouses and stores to manage stock, leveraging RFID and barcode technologies. • OCTO+ iWay is built to help brands to meet new customer expectations as well as new regulations regarding transparency and circularity.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Octo+ iWay is a SAAS Product Traceability and Transparency Platform. It is built on a scalable microservice architecture able to manage high volume of data inputs.

This event driven solution allows brands to capture, through a set of REST APIs, events from various sources during their products lifecycle.

All events are stored in a secure, scalable, distributed data base.

A flexible product master data management allows brands to customize their profile to match the specificities of their products.

Product marking is compliant with GS1 Digital Link at product/batch/single item levels.

A Digital Link Resolver allow customers redirection to contextual information.

Maturity level and application sectors

Octo+ iWay is available in production for every Brands eager to activate transparency and customer engagement through their products. It is designed to manage a high volume of data. The platform is continuously updated with new functionalities.

Useful link:

https://octoplus-iway.fr/

OriginTrail Decentralized Knowledge Graph (DKG)

OriginTrail Decentralized Knowledge Graph (DKG)

Global value chains and business networks have grown increasingly complex and become notorious for their lack of transparency. OriginTrail drives transparency in global value chains by providing a trusted knowledge foundation for AI and traditional solutions. OriginTrail Decentralized Knowledge Graph (DKG) merges knowledge graphs and blockchain technology, bringing to life Knowledge Assets. Knowledge Assets are discoverable and verifiable containers of data that can be connected to other Knowledge Assets, forming an interconnected web of knowledge. Through Knowledge Assets, businesses, governments, and individuals can share value chain data with the highest levels of trust, privacy, and connectivity. This lays the ground for solutions that advance value chain sustainability and safety, including Digital Product Passports. For a deeper look at Knowledge Assets, the DKG Explorer allows discovery of value chain data, history logs, consumer goods, and beyond (example Knowledge Asset of a Battery Passport).

Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

OriginTrail DKG is an open, trusted knowledge foundation for AI and other solutions, enabling organizations and individuals to exchange knowledge. Combining knowledge graphs and blockchain, it brings to life Knowledge Assets, a new resource for the internet with a unique combination of characteristics:

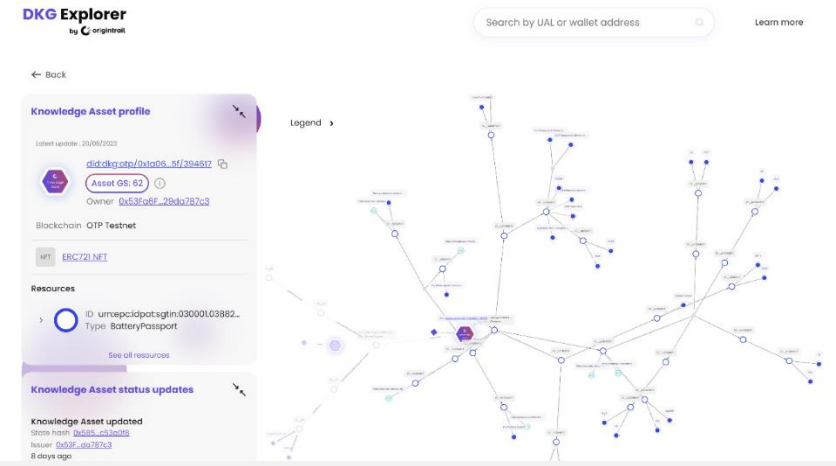
Ownership of each Knowledge Asset is represented by an NFT. As such, ownership of Knowledge Assets can also be verifiably transferred among partners in a business network.

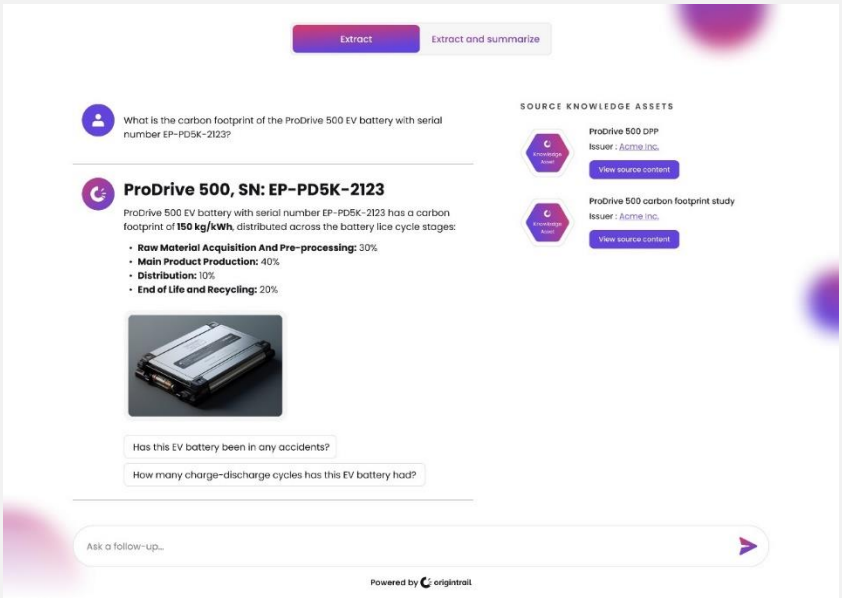
Discoverability and connectivity. Each Knowledge Asset has a Unique Asset Locator (UAL) and can be easily found on the OriginTrail DKG. Based on its UAL a Knowledge Assets can also be connected to other Knowledge Assets, from the same or different business partners, building a web of interconnected knowledge that extends beyond a single organization.

Verifiability. Knowledge Asset owner, data integrity, and status changes (status updates, ownership changes) can all be verified on blockchain at any time.

Maturity level and application sectors

OriginTrail trusted knowledge foundation has been in use for years across several sectors. In **supply chains**, OriginTrail is used to ensure traceability and transparency of products all the way from raw materials. For example Perutnina Ptuj, the largest poultry producer in Eastern Europe, uses OriginTrail to showcase traceability and sustainable practices of their premium poultry line to their customers. In **international trade,** OriginTrail is used by SCAN to exchange security audits for factories across the world, helping secure over USD 1.2 trillion of imports into the US. **Pharmaceutical** organizations use OriginTrail to ensure donated medicine reaches their patients. For example, AidTrust, an OriginTrail-based product, is used in India to monitor how donated medicine is distributed across 80+ treatment centers across the country, helping ensure patients with hemophilia get their medicine. OriginTrail is also used in transportation (Swiss Railways SBB), assurance (British Standards Institution), and other sectors.





Useful links:

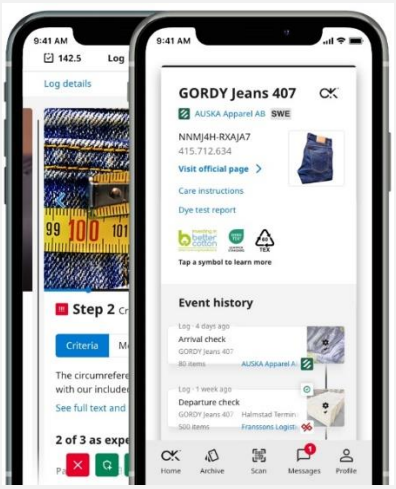
https://origintrail.io/

https://dkg.origintrail.io/

https://dkg-testnet.origintrail.io/explore?ual=did:dkg:otp/0x1a061136ed9f5ed69395f18961a0a535ef4b3e5f/394620

The OK Supply Chain Management platform

The OK Supply Chain Management platform
OK helps organisations in cross-industries manage and share documentation, work, and relationships for products, sites, workers, and the organisation itself.

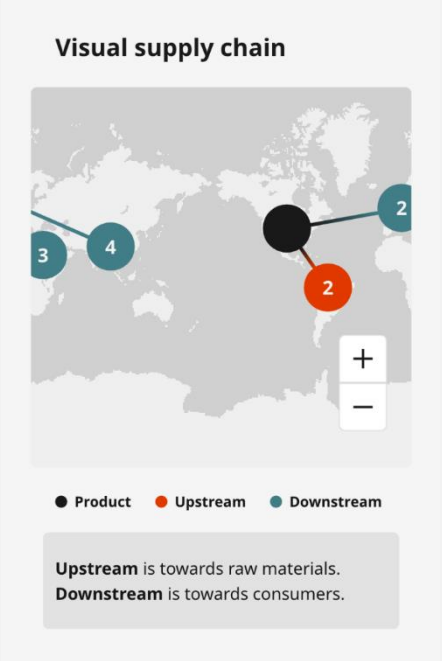


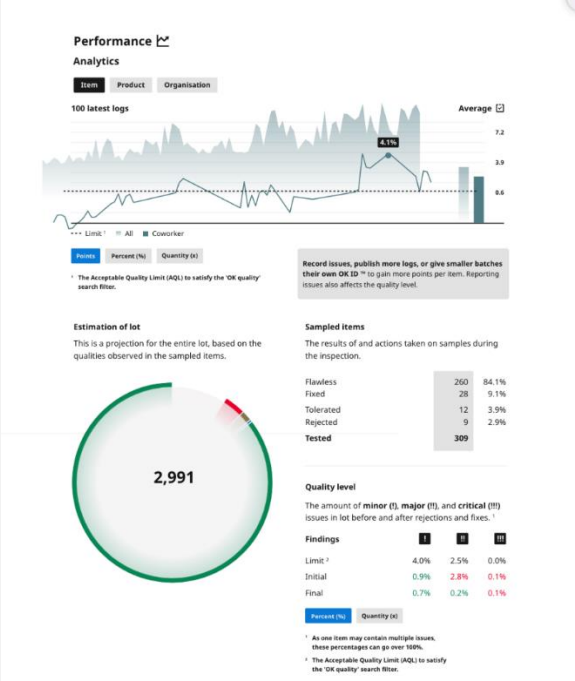
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials	Others		

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

- Powerful product database: comprehensive product information (linked products, relevant documentation, customer & producer feedback, etc.), easily identifiable & publically verifiable with unique OKIDs
- Digital-physical synchronization: Generating QR code asset labels and allows physical products to be verified easily through our in-built scanner
- Enables end-to-end supply chain transparency: Supply chain visualizations of linked products, verifiable user and organisation information
- Accessible analytics: Clear visualizations of asset quantifications to support further relevant analysis





Maturity level and application sectors

OK focus on intuitive user interfaces over depth, allowing small-to-medium enterprises to unify and share basic information across the value chain (including with end consumers) more easily and with a low barrier of entry. Our goal is to help companies start their sustainability journey and build brand trust through transparency over time, by sharing lab reports, quality control logs, automated visual supply chain maps of individual items and the like with ease.

At OK, we view it as our responsibility to our members to track the development of Digital Product Passports, Digital Ports etc. and build simple interfaces to synchronise data to such systems, even

if you are a smaller or growing actor without the engineering or financial means to implement enterprise level software. We want to live in a world where it is easy to buy, make, and maintain reliable and environmentally friendly things.

Current users: Battery, Electronics, Furniture and Construction. It can be used in any sectors.

Useful links:

https://oktrade.org
https://rethink-event.com/insight/an-ok-workflow-for-product-sustainability/
https://blog.okgrade.com/how-to-improve-supply-chain-collaboration-and-the-benefits-for-your-organisation-cbdcfb79b3ca

Pimster

Pimster
Pimster offers a cutting-edge Digital Product Passport (DPP) solution that transforms how businesses engage with customers post-sale by leveraging product-related data. This platform is designed to help brands move from a linear to a circular economy by fostering closer customer relationship. Pimster enables brands to collect and showcase data throughout the product lifecycle. These passports are based on open standards and are physically accessible to consumers directly on the product, ensuring transparency and ease of access. Pimster leverages converstional AI to enable direct, personalized experiences that scale across large brand catalog.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			

Unique technical aspects

Pimster's Digital Product Passport (DPP) is a modular solution aiming to connect consumer brands with their audience post-sales.

This system emphasizes a premium, data-driven onboarding experience, using engaging content such as stories and rich media articles. It is designed to gather user data, aiming to create lasting business opportunities. The platform is interoperable, localized and can be quickly deployed worldwide thanks to its scalable model.

The platform's unique CRM system captures and manages user data, while its admin interface, serving as a CMS, allows clients to easily tailor their digital engagement strategies. Its system is also integrated with the main marketing platform to send and receive data.

By integrating interactive QR Code onboarding and AI for personalized experiences, Pimster effectively supports brands in transitioning towards a more circular, sustainable economy, fostering stronger customer relationships and transparency in product lifecycle data.

Maturity level and application sectors

Since its inception in 2021, Pimster has rapidly advanced, positioning itself as an emerging leader in digital product engagement. Its platform has matured through continuous development, integrating cutting-edge features. Despite its recent establishment, Pimster's robust and scalable model demonstrates significant potential for further growth and innovation.

Pimster is tailored for industries such as mobility, multimedia, cosmetics, and home appliances. It excels in environments where premium and complex products are prevalent, primarily sold via distributors. The platform's versatility and adaptability make it an ideal solution for these sectors, offering an enhanced post-sales engagement and data-driven insights to refine customer experiences and product development strategies.

Useful link:

https://www.pimster.app/en/home

Peppol

Peppol
Peppol is a global network based on open standards, where you can connect once and reach everybody in the network. The format is based on ISO standards and any kind of product related information can be exchanged using the Peppol network. Suppliers and manufacturers are already using this network to provide this kind of data. It is a mature organization with well-established governance (Peppol Interoperability Framework) including legal agreements, governance, and compliance measures, operating in more than 40 countries all over the world. OpenPeppol, a non-profit international association established under Belgian law, was founded in 2012 as a follow-up to the PEPPOL Large Scale Pilot project (LSP) launched in 2008 and funded by the European Commission. The goal of the PEPPOL LSP was to enable frictionless trade between public and private bodies by developing Business Interoperability Specifications and standardising the exchange of business documents on an open and secure network.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Peppol enables buyers and suppliers to exchange business documents and processes by using the Peppol network in compliance with the Peppol Interoperability Framework. Peppol provides a ready-to-use, scalable, both domestic and cross border, four-corner model, utilising a market of private sector service providers that are connected to sending and receiving organisations.

The Peppol Interoperability Framework provides the specifications and the governance for the exchange of data over the Peppol eDelivery network. Peppol is based on standards from OASIS and CEN and can enable traceability based on specific business requirements.

The Peppol network connects the platforms of service providers, but it is not a platform in itself. The Peppol network is created by hundreds of Peppol-certified Service Providers around the world. They securely distribute message content (business documents or any product information agreed) between buyers and suppliers, based on an open, four-corner model.

Maturity level and application sectors

Although originally conceived as a European project, Peppol is increasingly being used around the world, therefore the market scope is international with high penetration. The interoperability framework is just as relevant for trade between private businesses (B2B) as it is for trade between public and private sector bodies (B2G). The Peppol network can be used for any type of information as long as it is defined in a standardized way and agreed by the partners exchanging it. Peppol has information models and technical formats for product information used for product catalogues and ordering used in the supply chain exchange. Because Peppol is being used for business process interoperability such as product information exchange, eCatalogues, eOrdering, etc., it is being used in any type of organization (public or private). The Peppol initiative is cross-sector, as Peppol is the main network for exchanging data regarding electronic catalogues, electronic invoices and other supply chain documents in all sectors of the economy.

Useful link:

https://peppol.org

ProDecipher

ProDecipher
ProDecipher is a pioneering company with a clear mission: "Deciphering Product Supply Chains to validate Sustainability Claims." Our dedication lies in addressing the pressing global challenges of intransparency and inefficiency that plague supply chains today. To tackle these issues head-on, we have developed ProSOS - a revolutionary set of tools, aptly referred to as "the Operating System," that enables businesses to effortlessly build and deploy supply chain traceability systems. ProDecipher's expertise lies in harnessing cutting-edge innovative technologies to streamline supply chain management, optimize operations, and promote responsible sourcing. Through our user-friendly interface, businesses can easily integrate ProSOS into their existing systems, regardless of their size or industry. The platform offers real-time data tracking, auditing capabilities, and smart contract integration to ensure accuracy, efficiency, and reliability.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling		Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

ProDecipher stands at the forefront of innovation by harnessing the power of decentralization and blockchain technology. Our unique technical aspects revolutionize supply chain management, addressing the challenges posed by complex data and confidential information sharing. Through blockchain, we ensure a secure and immutable ledger that fosters trust and transparency throughout the supply chain.

With our decentralized approach, ProDecipher eliminates the need for a central authority, making the supply chain ecosystem more resilient and resistant to tampering or fraud. Smart contracts facilitate automated and trustless transactions, streamlining processes, and reducing inefficiencies.

Our innovative use of blockchain technology transforms supply chains, simplifying complexity, and providing a seamless experience for businesses to validate sustainability claims and build responsible practices that resonate with conscious consumers and stakeholders alike.

Maturity level and application sectors

ProDecipher has reached an advanced maturity level in the application sectors of the Fuel industry, ood and Agri industry, and starting pilot project inTextile industry. With successful projects and the deployment of three use cases in the Bio-fuel supply chain (Fuel), spices supply chain (Agri product), and Chocolate supply chain (Consumer food product), we have demonstrated our expertise in providing comprehensive solutions for supply chain traceability and sustainability validation.

ProDecipher's success in deploying these use cases reflects our deep understanding of the complexities involved in different industries and our commitment to leveraging blockchain technology for secure, efficient, and decentralized data management. As a result, we are well-positioned to drive positive change, enhance consumer trust, and support businesses in achieving sustainability goals across the Fuel, Food and Agri, and Textile sectors.

Useful links:

https://www.prodecipher.com/

https://www.profueltrace.com/

Product DNA®

PRODUCT DNA®						
Trimco's ProductDNA® digital technology streamlines all stages of a product's life cycle to implement, monitor and achieve a brand's sustainability goals while complying with international regulations. ProductDNA® features **four modules**, each designed to facilitate a brand's sustainability goals; 1) The **Certificate Manager** helps brands monitor environmental, social, safety compliance documentations and any other document relevant to map and understand a brand's supply chain; 2) The **Product Manager** provides in-depth insights at the material level, including certifications and any other documentation, crucial for responsible sourcing and an essential tool for validating weight-based claims and answering the EU strategy for a circular and sustainable textile industry; 3) The **Digital Manager** involves the use of QR codes and NFC solutions to communicate and increase transparency with consumers as well as any other stakeholder involved in the product lifecycle. It includes PaaS options and connecting with the consumer via a product's digital ecosystem; 4) The **Packaging Manager** generates automated packaging reports for international EPR requirements.						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance			Category	
	Granularity	Model	Batch		Prod. order	Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code / Other
	Machine readable data carrier	Yes			No	
	Resolver	Yes			No	
Digital connector	**ID minting**	Centralized			Decentralized	
	Data storage location	Centralized			Decentralized	
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others
	Data packaging	Data transfer			API	
IT architecture: Access control	**Level**	Simple			Advanced	
	If advanced	Attribute based			Role based	
IT architecture: Data use	Labelling	Enforcement			Others	

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

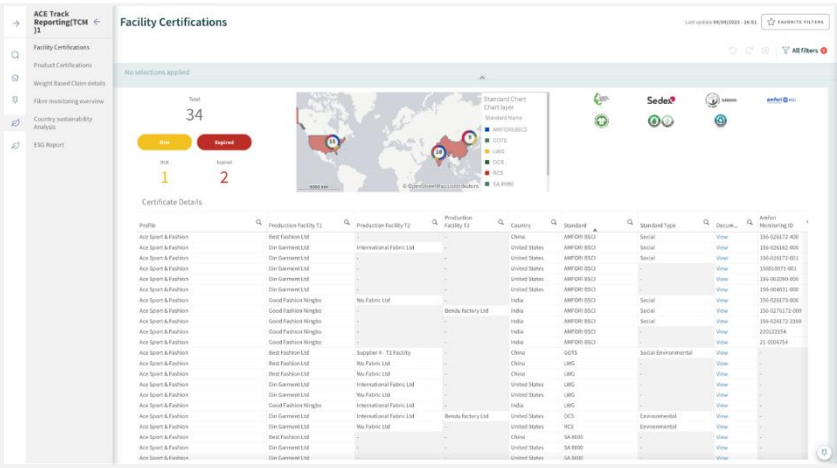
Trimco's ProductDNA® is built on composable architecture adopting MACH (microservices-based, API-first, cloud-native and headless) principles. The overall architecture consists of a Single Master location with centralised components such as integrations APIs and file storage; as well as satellite locations where interactions are hosted close to the user for better supply chain user experience. The security architecture ensures IT and data security, compliance and orchestration. The API based layers maximise interoperability and enable Product DNA® to connect to and collaborate with multiple supply chain partners and compliance authorities. The architecture and solution design maximise scalable solution with intelligent model generation for predictive analytics and machine learning, also focus on high scalability and flexibility with best UI/UX experience for supply chain users. A mobile app extension for value-added initiatives is possible and has been adopted by several companies. GS1 Digital Link standard is adopted with revolver capability for multiple use cases.

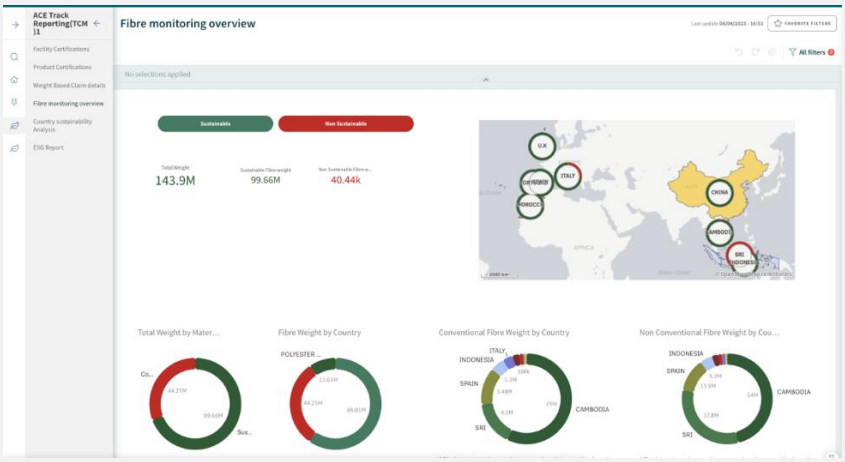
Maturity level and application sectors

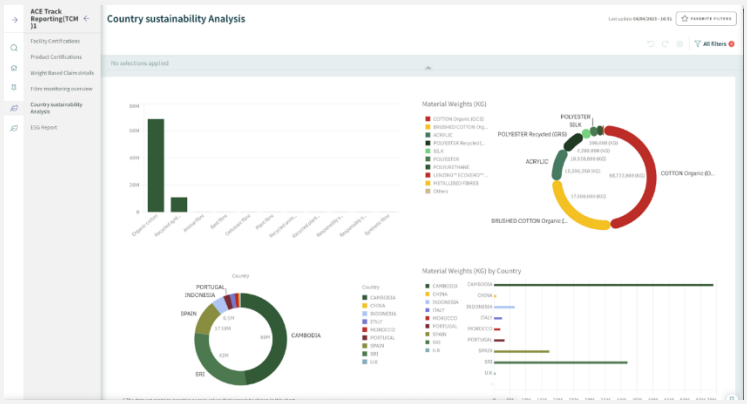
The onboarding of the complete 4 modules system is enabled by the already existing global network of garment factory and fabric suppliers, as well as the already integrated EDI API platforms between TRIMCO and textile and footwear brands since 2010. ProductDNA is today in use by **30 Global Textile and footwear brands,** among them DK Company, Asics, Dynamic Brands, Bergans, Tog24.

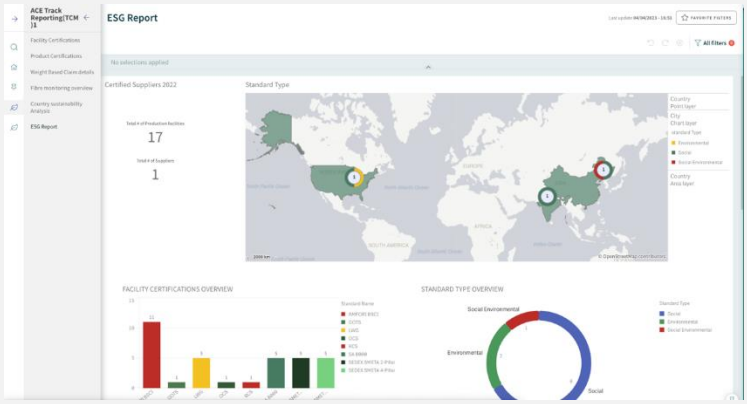
References and useful links:

- About ProductDNA https://www.trimco-group.com/solutions/product-dna-supply-chain-traceability/
- ProductDNA case studies https://www.trimco-group.com/?s=productDNA
- Scan QR code and check an example of DPP by ProductDNA
- ProductDNA dashboard overview:


Facility Certifications
34
1
2
Certificate Details


Fibre monitoring overview
Sustainable
Non Sustainable
143.9M
99.66M
40.44k


Country sustainability Analysis


ESG Report
17
1

QI-Digital

QI-Digital

QI-Digital is an initiative of the central players in German quality infrastructure (QI) - DIN, DKE, DAkkS, PTB, and BAM. The Federal Ministry of Economic Affairs and Climate Action (BMWK) supports QI-Digital as an essential contribution to the success of innovative technologies, products, and processes - to strengthen Germany as a business location.

The pillars are built on a foundation of suitable data structures, the QI Cloud, smart standards, digital product passports and digital certificates , as well as a corresponding legal framework. The interplay creates synergies that we use for the sustainable establishment of an agile innovation system for modern, digital QI. The resulting processes and procedures can be transferred to different use cases. For BAM, two use cases are considered: additive manufacturing and H2 gas stations.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

A digital product passport based on assets administrative shells which is compatible with other QI digital assets such as Smart Standards and digital certificates.

QI-Digital offers a unique approach to embed the DPP in the complete chain of quality infrastructure. Hence it is an important element make the DPP as the starting point to transform the EU single market into the age of digitization – in in other words “EU single market 4.0”.

Maturity level and application sectors

Maturity is in the concept level and user stories collections and requirement analysis.

Useful link:

https://www.qi-digital.de/

QI-Cloud

Solution Name: QI-Cloud							
The QI-Cloud is a trust network for mapping processes with and for a digital product passport. Its objectives are (1) to serve as single point of contact, where all information relevant to a product is contained in an abstract digital representation, (2) to offer uniform interfaces, that allow simple and transparent integration of data, and (3) to provide data sovereignty in the network by secure provision of data and consideration of the principle of minimality.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
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IT architecture: Data use	Labelling	Enforcement			Others		
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	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Full crypto-based security is provided via a distributed ledger PKI. Our solution supports a key-based login as well as signing of processes by certification bodies.

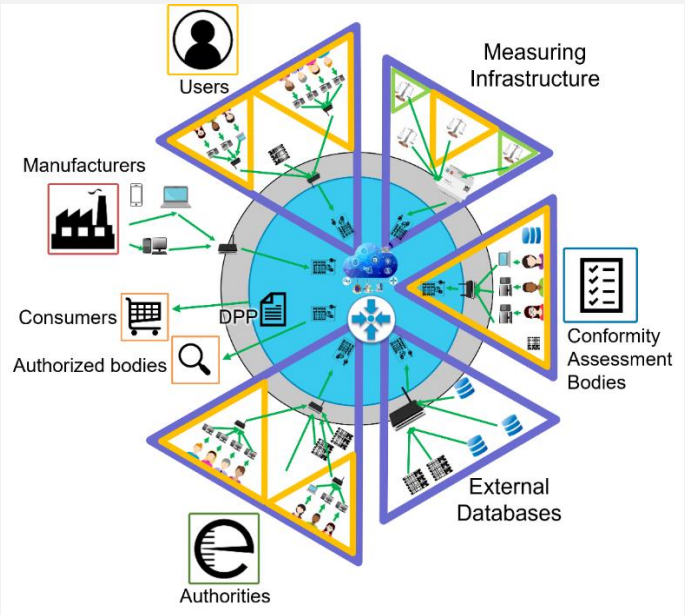
The distributed ledger facilitates secure processes and their distributed, tamper-proof logging, while also ensuring data consensus.

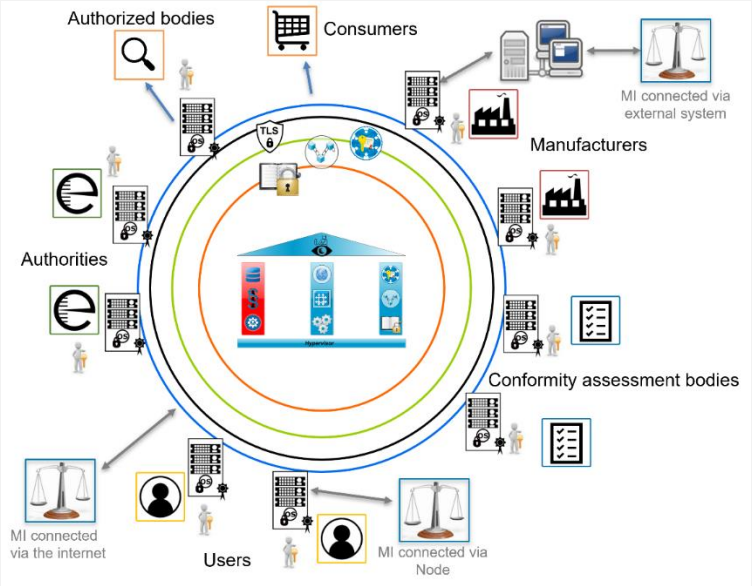
The data management supports an enriched data schema, allows access management, and offers a data merger.

Maturity level and application sectors

We developed a reference architecture that complies with all contraits that were initially derived from the requirements in the field of legal metrology. The reference architecture can be implemented in many ways and is, thus, generalizable to a wide range of different domains in the quality infrastructure system and beyond.

An OpenSource demonstrator code in RUST is being developed in order to encode all features of the reference architecture. The employed software stack is based on existing solutions and includes, amongst others, Raft, PostGres, ring/rustls, Hyper, Docker, and Debian.





Useful links:

www.qi-digital.de/en/qi-cloud
digital.ptb.de/qi-digital
digital.ptb.de/MetrologyCloud

RCS BP

RCS BP
RCS Battery Passport has clear data governance over a chain of custody system to issue the battery passport combining multiple threads of data from multiple data points. RCS BP incorporates different global users (public, regulator, commercial), to understand battery's ESG footprint/origin, tracing solution for passport material, recycled content and GHG emissions.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects
As the project is in the stage of proof of concept at the moment, the tech solution at the moment is prototype end-user website based on ReactJS and optimised towards mobile devices. In parallel

we are working on backend and database architecture design, depending on learnings and validations of our assumptions based on user feedback, after interactions with created hands-on prototype. As we are considering integration with RCS VINE possible tech stack could be based on Elixir with PostgreSQL DB, hosted in the Cloud (AWS or other providers), but as the track and trace part may require using distributed ledger some of the blockchain technologies are also in consideration.

Maturity level and application sectors

Prototype website for user hands-on experience with UX optimized for mobile devices, initial high-level system design and possible architecture scenarios (advanced product sprint, just before MVP development stage).

PoC, Considering different options.

Useful link:

https://www.rcsglobal.com/batterypassport/

Renoon

Renoon
Renoon stands as an end-to-end solution for **transparency management** and sustainability communication, with a distinct focus on the clothing and textile sectors. With millions of data points managed daily, Renoon's technology was built as a fundamental **layer** for ongoing voluntary and mandatory product compliance, acting as catalyst between company's existing internal systems, framework application and **go-to-market of the data** required with interoperability and modularity as key principles.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials		Others		
	Convenience	Wallet	Data Ports		Others		
	Data protection	PETs	Anonymization		Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

As an end-to-end transparency solution, Renoon was built for go-to-market optimization, where noteworthy differentiators include:

1. **Seamless integration & interoperability**: its smooth integration with existing company systems including but not limited to PLM/ERP systems, e-commerce platforms. Renoon's system was built with a robust API driven infrastructure that welcomes data integration with third-party platforms.

2. **User-friendly interaction**: a serviced self-service dashboard allows company users to have full control and oversight over the platform. User-friendly test scripts are run after every major deployment of new features.

3. **Scale**: Renoon excels in managing high-scale data, offering multiple storage options with structured replicas and backup snapshots. The API and export options provide flexible data access. The infrastructure easily accommodates various input volumes and formats.

4. **Modularity**: Renoon offers tailored solutions through pre-built base modules adaptable for different functions. Notably, it integrates impact measurement frameworks, including LCA-based assessments.

5. **Go-to-market ready**: with Renoon's consumer facing interface for voluntary or mandatory disclosures.

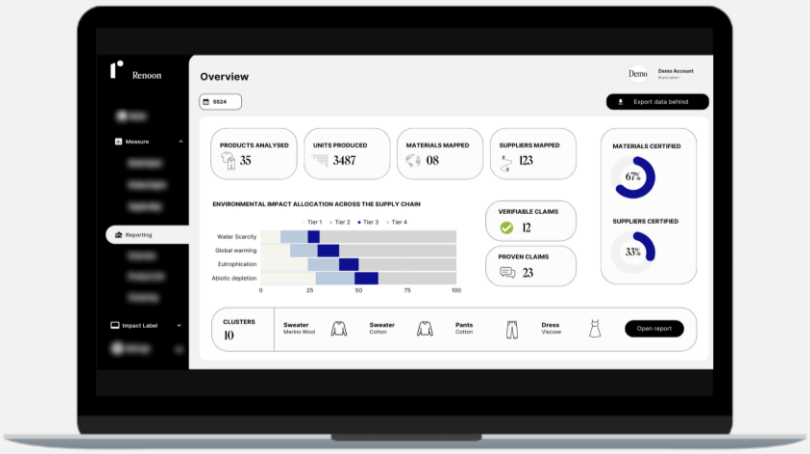
Maturity level and application sectors

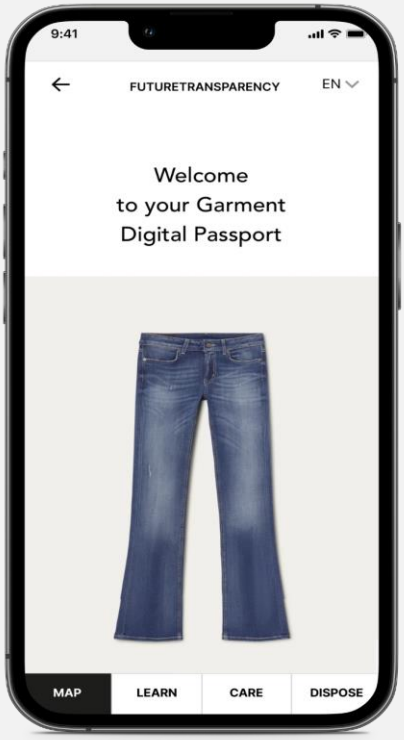
Renoon's technology, both **enterprise ready** and extensively proven as go-to-market solution for **SMEs**, is meticulously built to cater to the nuanced needs of the apparel and textile sector, ensuring optimal solutions across diverse markets.

As a member of multiple sector-based hubs (such as Textile Exchange), Renoon is fortified by support from government-backed entities, most notably Invitalia Smart & Start.

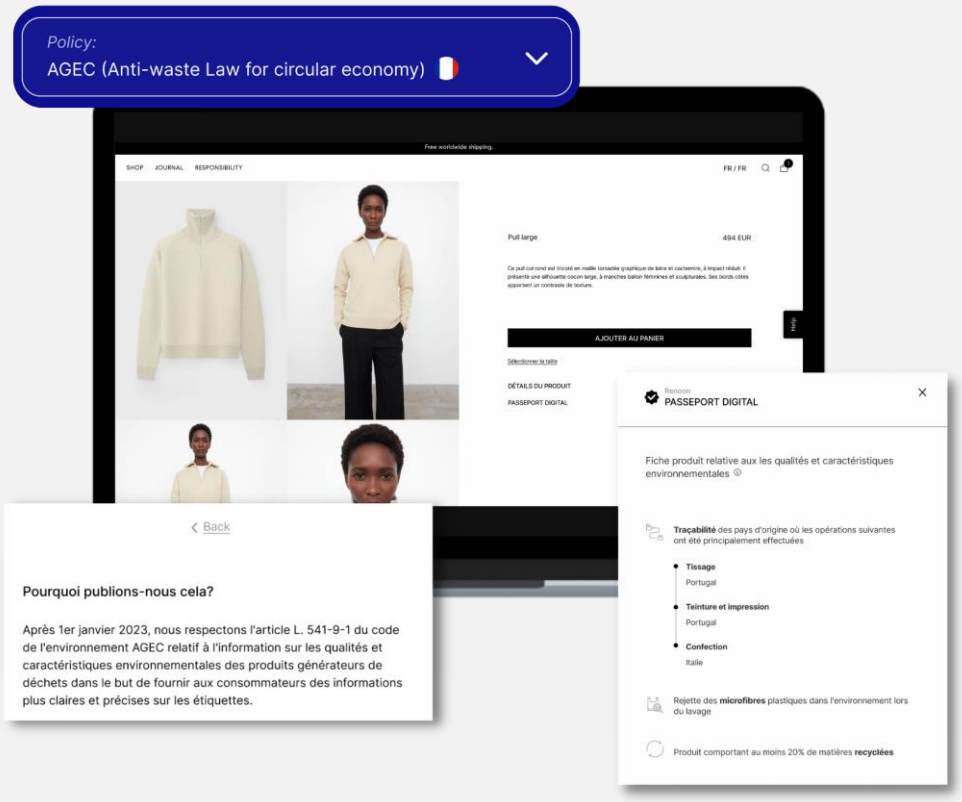
The collaboration on substantial projects with industry leaders, such as Sopra Steria, serves as a testament to Renoon's technical expertise.

The company's solution appears on multiple media outlets (see below). Furthermore, Renoon's attainment of the highest Net Promoter Score (NPS) among clients underscores its steadfast dedication and effectiveness in the industry.


Renoon
Overview
PRODUCTS ANALYSED
35
UNITS PRODUCED
3487
MATERIALS MAPPED
08
SUPPLIERS MAPPED
123
MATERIALS CERTIFIED
67%
SUPPLIERS CERTIFIED
33%
ENVIRONMENTAL IMPACT ALLOCATION ACROSS THE SUPPLY CHAIN
VERIFIABLE CLAIMS
12
PROVEN CLAIMS
23
CLUSTERS
10
Open report


9:41
FUTURETRANSPARENCY
EN
Welcome
to your Garment
Digital Passport
MAP
LEARN
CARE
DISPOSE


9:41
COMPOSITION
98% cotton; 2% elastane
TRACEABILITY
95%
Main component: 98% cotton
RAW MATERIALS
Akasya Tar
TURKEY
WEAVING
Denim da Matteo
MILANO, ITALY
DYEING
Denim da Matteo
MILANO, ITALY
MAP
LEARN
CARE
DISPOSE



Useful link:

Unspun, Renoon partner to provide supply chain, sustainability insights

Triarchy taps new supply-chain-tracking tech partner

Digital Product Passports Will Be Key To Fashion's Transparency

RR

Reserve Resources (RR)							
SaaS from where textile recyclers can collaborate with fashion brands and textiles waste suppliers (manufacturers, post-consumer sorters) to access the waste in large aggregated volumes and by their required spec (fibre composition, fabric type, colour, right preparation, quality check), including help with best set up of the necessary supply chains. Brands and public sector can get market insight, aggregated data and trace verification of textile waste flows from source to recycling, do planning and matchmaking or policy development.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Traceability of textile materials is unique: when materials are passed from one party to another, we register batches, but through inhouse processes we allow mixing of batches and apply a mass-balance approach. We don't do any trace product by product, but material category by category (e.g. 100% cotton knit scraps). We also enable trace of brand share of the waste throughout the supply chain with the same approach.

Maturity level and application sectors

Our SaaS offers a service for 4 stakeholders: brand, recycler, waste supplier (e.g. garment factory, a hotel or a post-consumer sorter) and waste handler (any type of preprocessor in between supplier and recycler). The product is fully operational and covers the majority of key features needed for brands and garment factories (industrial waste) for the basic processes. We are currently ~50% level with features for recyclers and handlers, and we are just starting to include post-consumer collectors.

RETEXCYCLE

RETEXCYCLE
We are a leading mass integrity software company dedicated to tracking various textile materials, both virgin and recycled, throughout their entire lifecycle. Our innovative approach involves creating a digital twin for each material produced, allowing us to monitor its journey from the origin point to the final product. Additionally, our system generates transaction certificates that include crucial details such as weight and geolocation, providing comprehensive insights as materials progress along the value chain. To enhance our tracking capabilities, we integrate physical tracers from https://tailorlux.com into our solutions, which are independently certified by Servicios de Trazabilidad - Eurofins Scientific for detection and quantification.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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Digital connector	**ID minting**	Centralized			Decentralized		
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IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)	Others				

Unique technical aspects

Digital twin, cloud based SAAS platform with ,ass integrity calculations along the product journey, from raw materials up to finished products and even till the residue.

IOT connection to Tailorlux dosing devices

Hyperspectral detection of Tailorlux photoluminiscent tracers

Eurofins labs third party certificate of detection and quantification to proof traceability

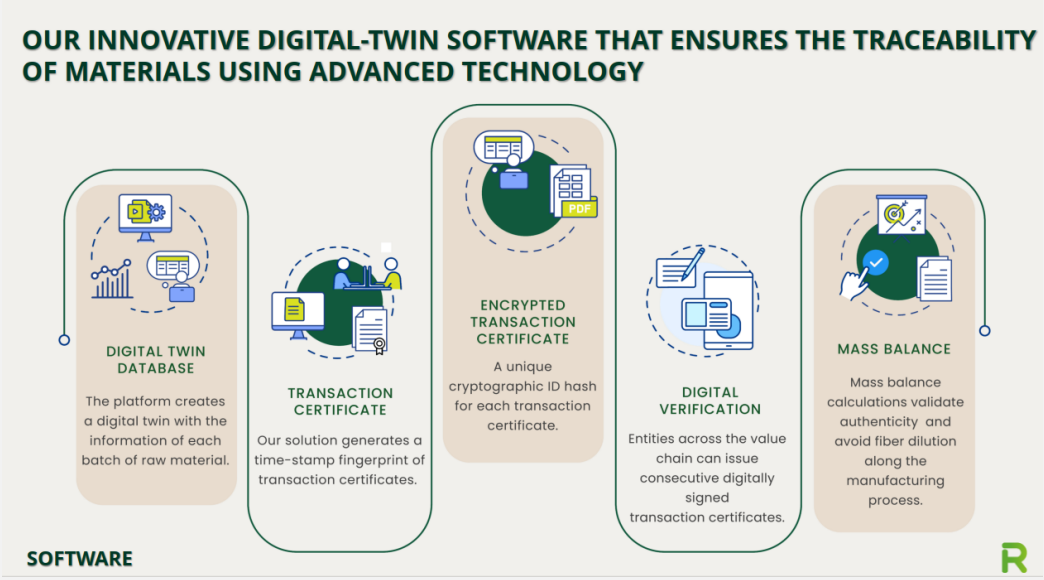
Holistic integration of different material mixture on one item to track different origins that converge in a finished product.

Maturity level and application sectors

- TRL9 full market presence with large customers using it.
- Tracing any kind of materials, from natural fibers to thermoplastics.
- Sheep to garment traceability in the wool.
- Seed to gin and gin to finished products in cotton.
- Pre and post-consumer tracking for cotton, wool, viscose, polymers like PET, PP, PA, Acrylic, etc.

Sectors:

- All kinds of fibers, yarn, fabric, and garments.
- Proof of recycled content materials on any product along the textile value chain.
- Rubber traceability from tree to finished product.



Useful links:

SEHTTPS://TAILORLUX.COM

HTTPS://RETEXCYCLE.COM

SecureTag

SecureTag
We are developing a system for digital product passports for products with a high degree of counterfeiting, where we both provide insight for the customer into the production process by giving them access to data such as the product's carbon dioxide emissions, as well as a secure way to transfer ownership of the product on the secondhand market. This is done through waterproof NFC chips in the products that are linked to the product passport, and also after the sale, to the legitimate owner. By doing this, we can make it more difficult to sell stolen or counterfeit products on the secondhand market. An owner can simply tap the item with their mobile phone's NFC reader and see all the relevant information, as well as transfer ownership to a new owner when the product is sold on the secondhand market. All of the co-founders are students at the Royal Institute of Technology in Sweden.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Resolver	Yes		No			
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IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

By using GS1's standards for product identification, we can leverage already existing infrastructure to help partners more easily implement our solution. We are also leveraging already existing serialization efforts in our target partners, which we will be able to use to track the ownership of the individual products on the secondhand market, thus helping achieve greater transparency in those transactions and increasing trust.

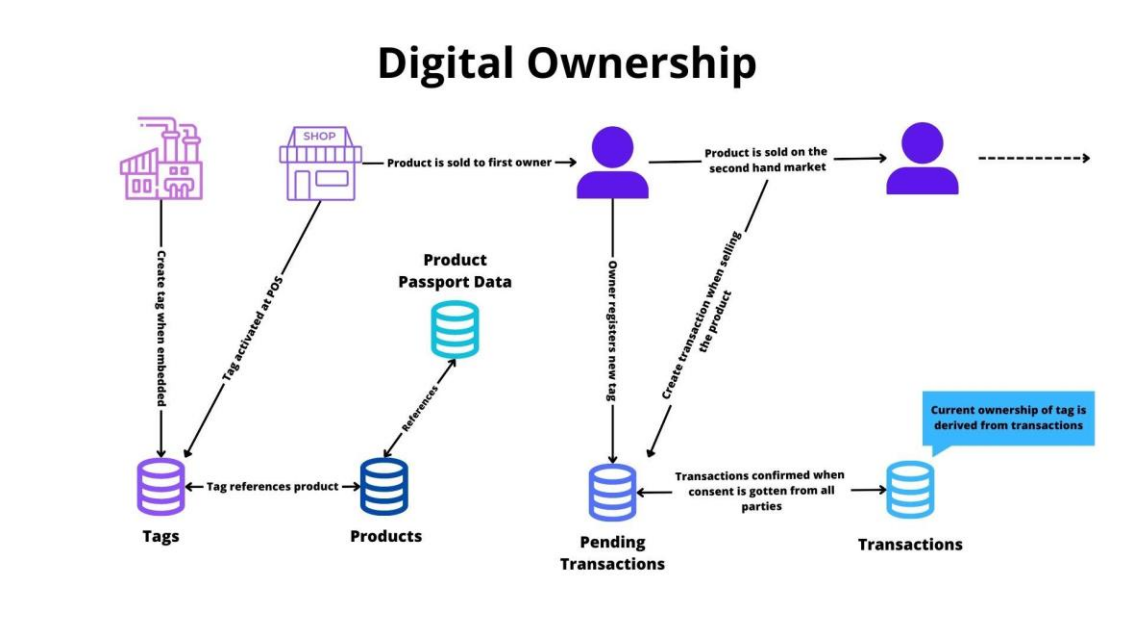
We believe that anonymous statistical information on how the products sold by a brand fare on the secondhand market can be valuable to them, (especially if they want to encourage a circular usage of their products) and view our compilation of this data for them as a unique technical aspect of our solution.

This data has always been inaccessible to these companies, and by making it accessible to them, we hope to help them make their product portfolios more sustainable!

Maturity level and application sectors

We're currently finishing the development of an MVP for the backend of the solution, having finished working on the UI/UX design. The information systems are developed in communication with GS1 Sweden, from which we gain valuable insight in making the solution scalable by leveraging current manufacturing and trade standards.

Our main application sector for this system is the luxury goods market, where we see a need to achieve greater transparency in the secondhand market. We believe that tracking the ownership of these products can be a good way of achieving this.



Sloer

Sloer
Sloer is connecting brands to their products all along their life cycle. The product is a responsibility but also a source of value at any moment of its life making new business models possible (such as getting commissions on each resale, getting new materials from wastes). Our unique digital ID is enriched by external traceability, recycling & reparing solutions whilst connected to our CtoC resale platform designed to create the maximum value for brands & customers.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Convenience	Wallet		Data Ports			Others
	Data protection	PETs		Anonymization			Others
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects
Our digital ID is a Cloud Data base accessible via QR code. It contains 4 purposes: traceability, reparability, recyclability & resale all being filled in by the brand in a basic version. The date base can be enriched by external solutions adding more precise & valuable information with time. We don't claim to have integrated all uses ourselves, we claim to partner with specialists to connect

their information to ours having in mind our business is about customer's interest in scanning the QR code because he/she will decide alone what to do with the product at the end.

Maturity level and application sectors

Our QR code is ready for textile industry & linked to our CtoC platform which will be live in September/October 2023. We started to equip the first samples & we'll go on production for the first products in September with 5 brands. The information from external partners is to be added manually so we are currently working on automation systems & middle where solutions to connect various data bases to ours. We're aiming to create a working group to study other architectures where the ID would be hosted & owned by brands as we believe flexibility is key for brands.

SORGA Technology

SORGA Technology

SORGA Technology is a secure DPP solution based on public blockchain, with a focus on impact and data protection (no use of any GAFAM solutions).

Its aim is to develop responsible consumption, with a particular focus on beauty and fashion, thanks to an intuitive DPP that brings together upstream data from the manufacture, its authentication at the time of purchase, and post-purchase events (repair, resale, recycling).

It has been designed by one of France's top 500 CSR mission-driven companies, an expert in retail innovation (the MAP EMULSION agency), a pioneer in cybersecurity and blockchain (KeeeX), and based on exclusive international patents in cryptography from the French National Center for Scientific Research.

SORGA's expertise lies in authenticating data, securing it, and making it easily verifiable for all players in the product lifecycle (B2B and B2C).

The solution is designed to be open, not to impose data centralization or protocol.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
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IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials	Others			

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

SORGA provides identifiers by reference, by batch and by unique product, as well as an enriched QR codes in GS1 Digital Link format to link the component or finished product to its tamper-proof passport.

The SORGA solution provides a Saas platform for managing content, products, and interactions with their successive owners, as well as APIs to facilitate data exchange with other systems.

Access control to the management platform is based on roles with different access rights, and always requires dual identification.

SORGA's innovations mean that the carbon footprint of blockchain anchors is not only particularly low, but fully offset: SORGA DPPs optimize its client scope 3.

The decentralized mode enables the creation of a vault inside each original proof where it is hosted, rather than a vulnerable central vault for all proofs.

Authentication, security and proof of data integrity with SORGA is possible on all digital formats.

Enjoy SORGA’s public and business-oriented resolvers.

Maturity level and application sectors

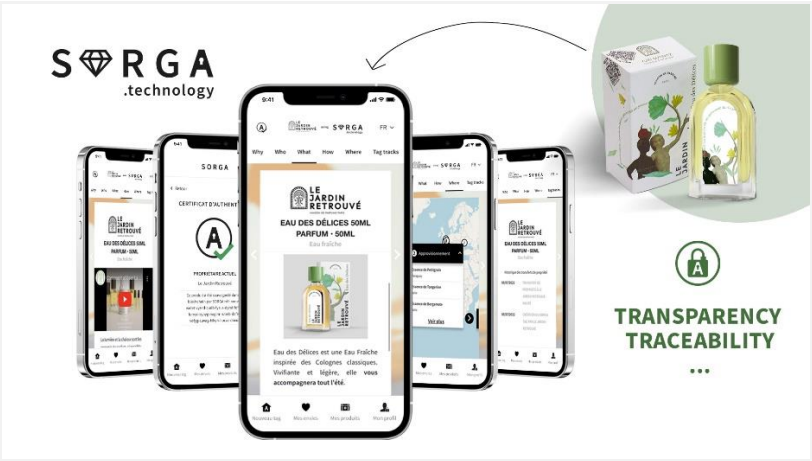
SORGA has been recognized by the United Nations as a solution accelerating 5 of the 17 Sustainable Development Goals.

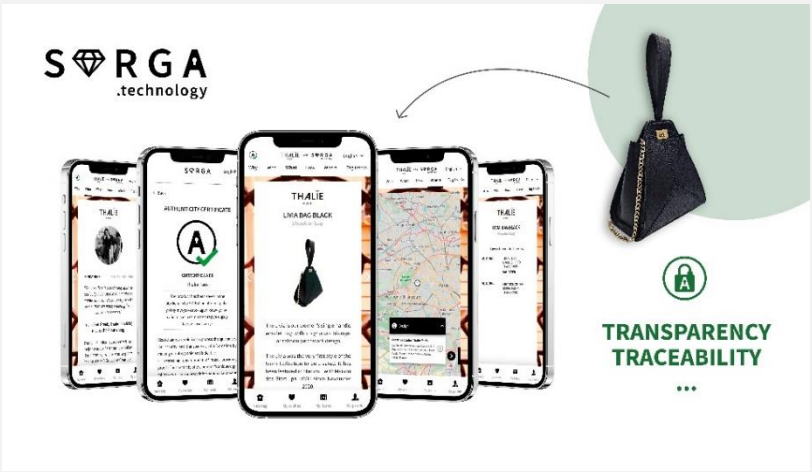
The European Union did the same during its Sustainable Development Week.

SORGA's innovations have earned it finalist status in the GS1 US Start-up Lab competition, 2 gold awards at Vivatech Paris, SAP's "The future of the retail" acceleration program, and the title of best digital traceability solution for luxury goods in 2023.

In terms of business feedback, SORGA was voted best innovation for the entire industry by Cosmetic Valley at Comestic360 Paris and was a finalist in the Digital Beauty Awards and Shiseido's Fibona competition.

SORGA already equips brands that want to provide tamper-proof proof of their commitments in the skincare, fragrance, make-up, hair care, men's care, fashion, and leather goods categories.





Useful link:

sorga.org

Spherity DPP Solution

Spherity DPP Solution

Spherity's DPP solution is an interoperable, trusted, and secure data exchange and compliance tool.

Receive Trusted Data
Process trusted data from your suppliers, such as GHG emissions reports, ESG compliance, and validated company data.

Market your products
Inform your customers about your USP, Eco-labels, and the sustainability aspects of your product, e.g., the percentage of recycled material used.

Reach Legal Compliance
Fulfill your reporting obligation for various upcoming EU regulations, such as the Ecodesign for Sustainable Products Regulation or the Green Claims directive.

Become Interoperable
The solution is based on open standards which avoid vendor lock-in and naturally facilitate interoperability with other DPP solutions and simplifies data exchange with your supply chain partners.

Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		

Digital connector	**ID minting**		Centralized		Decentralized
	Data storage location		Centralized		Decentralized
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others
	Data packaging		Data transfer		API
IT architecture: Access control	**Level**		Simple		Advanced
	If advanced		Attribute based		Role based
IT architecture: Data use	Labelling		Enforcement		Others
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials	Others
	Convenience	Wallet		Data Ports	Others
	Data protection	PETs		Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)			Others

Unique technical aspects

The DPP solution gives every stakeholder complete control over their own data by using a decentralized approach. Each stakeholder has their own instance of the solution, which includes a decentralized identity wallet. This wallet manages the storage, issuance, verification, and exchange of information regarding products and companies. The wallet implements standards like DIDs, Verifiable Credentials, and DIDComm, ensuring compatibility with other DPP solutions.

Using the solution, two parties can create encrypted channels to exchange information securely without an intermediary. The recipient can verify the authenticity of the information even if it was not directly received from the issuer. This is highly beneficial in supply chains as it grants stakeholders throughout the entire lifecycle of the product access to verifiable product information.

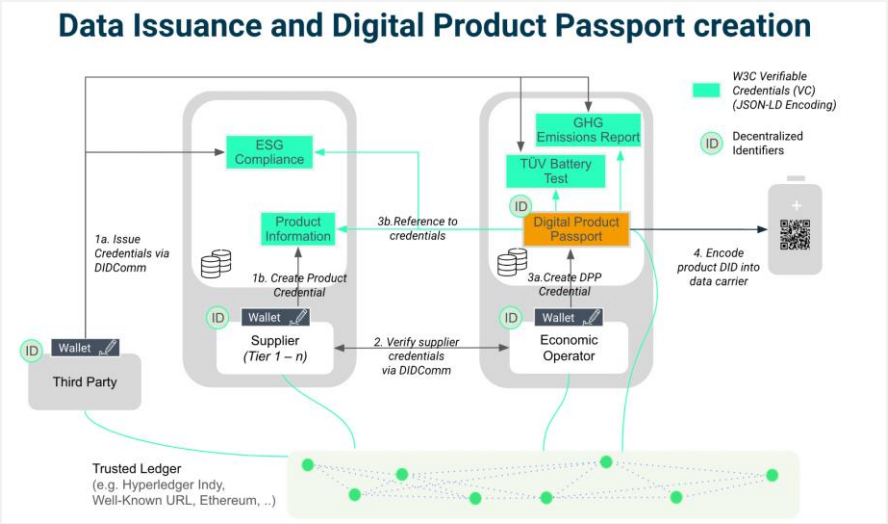
Maturity level and application sectors

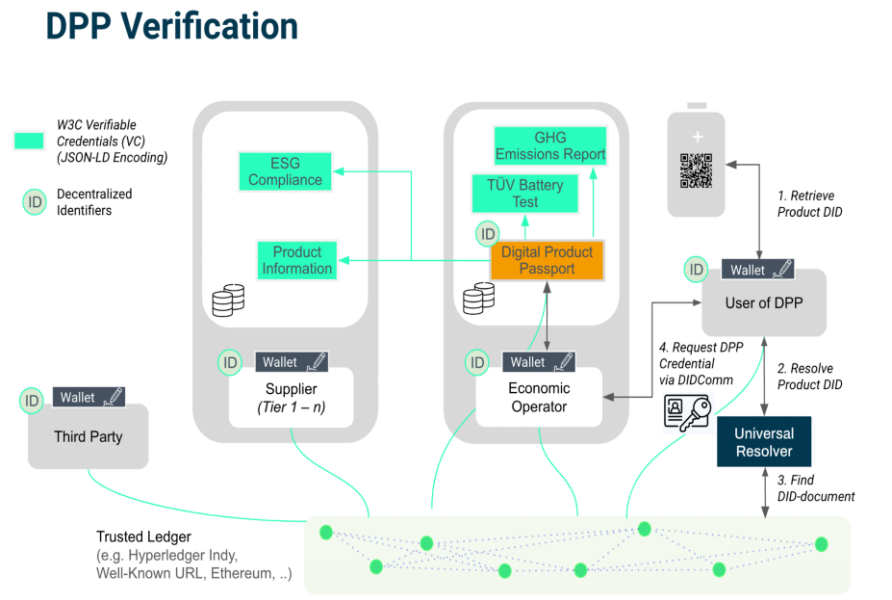
Spherity's system is currently being used in production to exchange information related to organizational identity in the US Pharma Supply Chain. Companies in ths supply chain use Spherity to perform Authorized Trading Partner (ATP) authentication to comply with the Drug Supply Chain Security Act (DCSCA).

The DPP system which also comprises product data in addition to oragnisational credentials and enables the generation of DPPs is currently in the pilot phase with a focus on the battery supply chain. Furthermore, Spherity is leading DPP specification and development in the EU-funded research projects MaDiTrace (Critical Raw Materials for batteries). Trace4EU (agri-goods and textiles).

Further pilots have been completed or are underway in the energy sector, consumer goods, and life sciences. As a consequence, the solution is applicable in a wider range of sectors requiring a Digital Product Passport and secure information exchange along the supply chain.

The below Diagrams illustrate the functioning of Spherity's DPP solution which is based on decentralized identity standards. For a full explanation of these diagrams, refer to our blog article [Implementing Digital Product Passports using decentralized identity standards]





Useful links:

Implementing Digital Product Passports using decentralized identity standards

Accessing Digital Product Passports with DIDs

The Digital Product Passport and its technical implementation

Digital Products Passport Pioneers podcast

SPINISE

SPINISE
General Intelligence is an AI powered textile technology company that focuses on connecting the supply chain through digital technologies, specializing in supply chain traceability, sustainability certification, Digital Product Passport, and carbon footprint management. We are centered around addressing supply chain challenges with a focus on industry ESG principles. We aim to enhance transparency, compliance, and agility within our product lines, fostering a sustainable and responsible approach to business operations. We value efficiency in brand and supplier authentication, compliance, sustainability, and resource allocation. We prioritize saving time, manpower, cost and energy while creating a conducive environment for innovation and growth. GI, as a global enterprise with a diverse team, has robust environmental and social sustainability goals. Operating within a SaaS model, our business thrives on providing subscription-based services, which is an ongoing endeavor.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Integration (100% automatic upload): GI's SAAS platform comprehensive API for textiles, integrating with ERP/MES for efficient order handling, material reporting, and certification management, boosting supply chain productivity and clarity.

Fraud Detection: GI's advanced system employs verification rules to identify data irregularities, protecting supply chain integrity and ensuring adherence to regulations.

BaleID: GI offers traceability to the individual cotton bale, enabling origin verification and full supply chain visibility. The current configuration supports US/Brazil/Australia cotton Bale ID's and also has the capability for batch level tracing for Indian Cotton.

Multi-Fiber Tracking: GI's platform monitors multiple fiber types, crucial for certification and quality control of mixed fiber products.

AI Power:

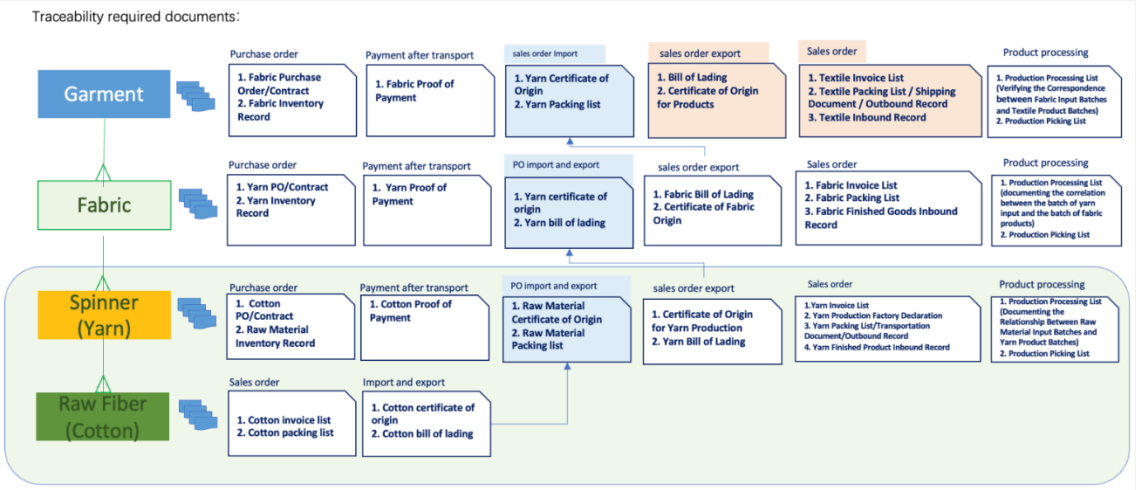
1. Page Translation
2. AIGC Various Format Reports: support traceability & sustainability, and other 3rd party requirements
3. Data Extraction: including ID & PII for alerting
4. Sensitive Information Alert: based on blacklist or PII ru
5. Formal Verification: to reduce review workload markedly
6. Natural Language Query: ask like Siri, about PO or certain supplier

All-in-One: GI's unified platform brings together textile industry functionalities, from compliance to carbon verification, in one place, eliminating the need to use multiple systems. The platform is designed to align with the CBP, DPP, Carbon and 3rd third certification requirements.

Maturity level and application sectors

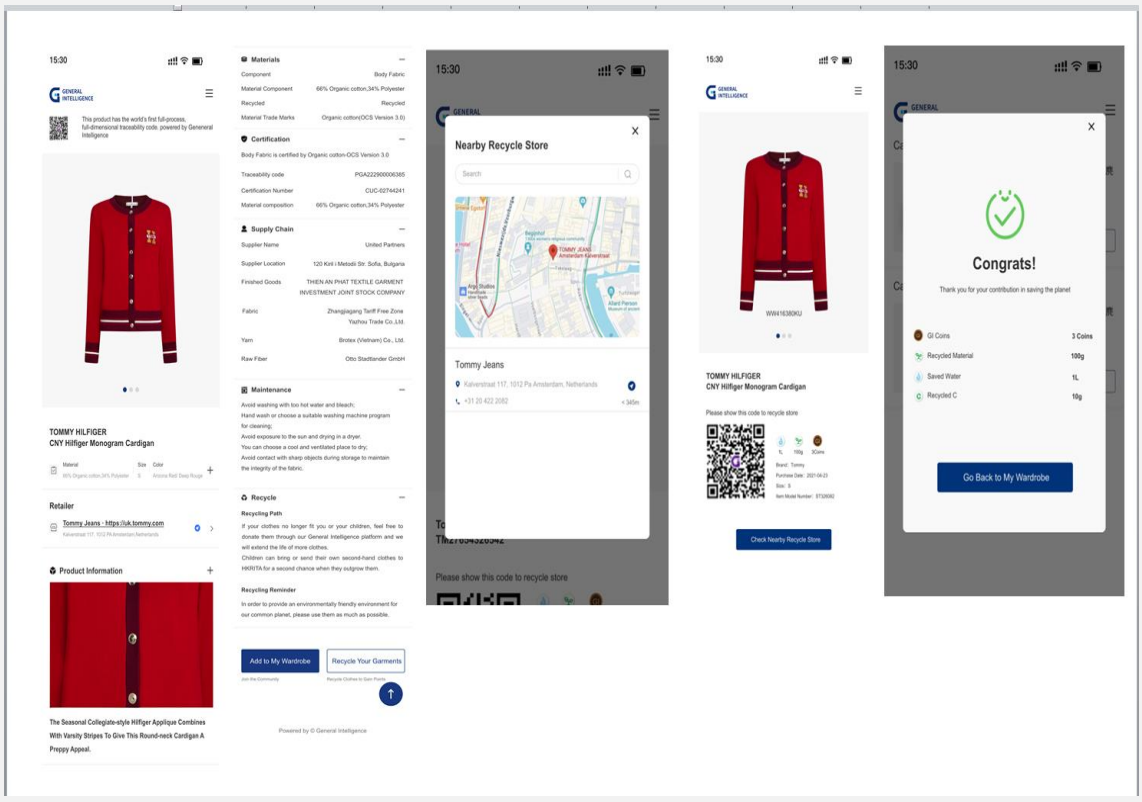
Founded in 2005, GI Company provides professional technical services to the global textile industry with over 1,000 clients across the US, Europe, and Southeast Asia. Its clientele includes top firms like PVH Corp and Toray Industries, covering the textile supply chain from farming to finished products. GI provides order collaboration, full traceability, sustainable certification, and adaptable data declaration standards, ensuring dynamic compliance with various regulations.

The platform ensures end-to-end traceability from raw materials to recycling. Finished products are connected to end consumers and retail stores through QR code hangtags. Not only can consumers view the production and certification information of individual garments, but they can also add them to a digital wardrobe after purchase, participate in in-store recycling activities, and receive NFT badge rewards. These creating a complete closed-loop consumer experience.



The GI Data Platform automatically consolidates data items based on each PO's transparency and compliance requirements and captures data through harmonized data standards and filing tools. The platform is able to meet multiple compliance requirements within the same order as well as avoid potential duplicate submissions.

Traceability/ Detailed material & certifications/nearby recycle store/QR code for recycling/Recycle to gain points



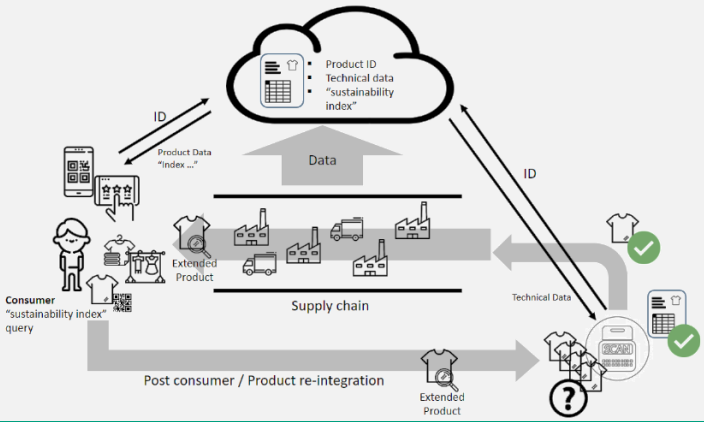
Useful links:

Website: https://www.gimind.com/

White papers: https://www.gimind.com/category/white-papers/

STVgoDigital Texjourney

STVgoDigital Texjourney
STVgoDigital project intends to access secure and reliable information on the sustainability and circularity of textile products, including information about who, where, how, with what and under what conditions the product was manufactured. The project aims to define and develop a digital copy of a textile product with an emphasis on sustainability and circularity, to be able to support services for the various players in the life cycle of the product. To achieve that goal, we developed a system that collects various indicators (manually and automatically), such as resource consumption and pollutants emitted, registering the detailed information about each of the value chain activities. Also, economic and social indicators are collected, such as the certifications of the company, salaries and the number of workers. Using a suitable developed model, algorithms, and platform to compile the data, our system allows sharing of data with its users about environmental and social indicators for each of the products, enabling the environmental and social scoring of every traced product lot.



Mapping with respect to the reference framework							
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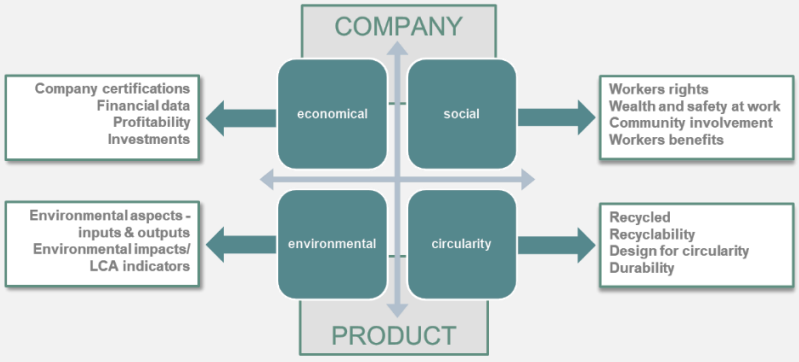
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports		Others
	Data packaging	Data transfer			API		

IT architecture: Access control	**Level**	Simple	Advanced	
	If advanced	Attribute based	Role based	
IT architecture: Data use	Labelling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

There were several technical aspects developed during the course of this project such as:

- **Sustainability Index:** A sustainability index was defined and calculated, represented in the form of a global score, which makes it possible to classify the impact of the individual textile articles, taking into account the impact in relation to economic, social, environmental, and circular factors, as represented in the following figure:



- **Real data:** Instead of using estimated data, this system uses real data, collected automatically and manually for the particular textile product item being produced, and related to its production lot;
- **Data carrier:** Different alternatives have been developed for data carriers that survive the entire life cycle of the textile article, such as invisible thermochromic QR codes or NFC tags;
- **Decentralized storage**: With the use of blockchain technology, which is a type of distributed ledger technology (DLT), data storage is decentralized;
- **Data confidence model**: developed to assesses the reliability, accuracy, and completeness of data, in order to ensure that the data collected is reliable;
- **Supply chain interoperability**;
- **Traceability support**.

Maturity level and application sectors

Our system is the result of an R&D project, developed in a collaborative environment, ranging from research institutes, software providers and some Portuguese SMEs from the T&C textile industry, focusing two different value chains: a centralized vertical one, with only one player dedicated to home textiles and a horizontal one with different SMEs engaged in the process, dedicated to clothing items. Bearing this in mind, our system was already validated at TRL 6. The technology has progressed beyond the laboratory or basic research stage and was tested in an industrially relevant environment (TRL 6) in two different value chains, being now ready for testing in real-world operational environments (TRL 7). We are now conducting additional tests focused on verifying the functionality and performance of the prototype or model under realistic operating conditions and complex, including international value chains. The successful completion of TRL 6 sets the stage for subsequent stages, such as full-scale production, deployment, and commercialization of the technology.

Useful links:

http://www.stvgodigital.pt/

https://texjourney.com/

Surfboard Digital Passport

Surfboard Digital Passport

Australia's coastal identity is intricately linked with surfing, a sport celebrated worldwide and deeply ingrained in Australian culture. With millions actively participating and countless more immersed in the surfing lifestyle, Australia's extensive coastline, consistent waves, and vibrant surf communities have solidified its global reputation as a premier surfing destination.

Pentalym, headquartered in Kiama, a south coast town surrounded by surf breaks, aims to integrate surfboards with digital product passports for real-time traceability and comprehensive information. This innovative approach enables the monitoring of every aspect of a surfboard's lifecycle, from production to delivery, with options for sustainable product reuse. Customers have the ability to review surfboard information via a Pentalym embed smartCode which includes product information, returns, warranty and how to return for repurposing/sustainability to reduce the number of surfboards going into landfill.

Pentalym's Digital Product Passport as a Service (DPPaaS) offers a complete solution that aligns with the European Commission's Circular Economy Action Plan. As an associate member of the CIRPASS consortium, Pentalym is uniquely positioned to assist brands in adopting digital solutions, with experience in tracking millions of items across the supply chain.

Pentalym's digital solutions, including RFID technology, are already embraced by various industries and can enhance product management and customer experiences. By implementing DPPaaS, brands can showcase their commitment to sustainability and engage customers through transparency and product lifecycle insights. The future promises to provide valuable insights for preemptive actions, waste reduction, and sustainability enhancements. Early planning and DPPaaS adoption are vital for companies facing digital transformations to ensure compliance, sustainability, and product longevity in a dynamic market.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance				Category	
	Granularity	Model	Batch			Prod. order	Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes				No	
	Resolver	Yes				No	
Digital connector	**ID minting**	Centralized				Decentralized	
	Data storage location	Centralized				Decentralized	
IT architecture:	**Openness level**	Standardized	Proprietary		Data ports		Others

Data transport	**Data packaging**	Data transfer		API
IT architecture: Access control	**Level**	Simple		Advanced
	If advanced	Attribute based		Role based
IT architecture: Data use	Labelling	Enforcement		Others
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others
Unique technical aspects				

Pentalym Surfboard: Your Wave, Your Digital Odyssey

Digital Passport's Birth: Pentalym's digital passports blend tradition and tech, offering transparency in the surfboard journey.

Crafting Clarity: We showcase authenticity and craftsmanship, providing a transparent window into our manufacturing process.

Eco-Conscious Insights: Beyond craftsmanship, our passports empower surfers with eco-friendly choices and environmental impact details.

How Surfboard Digital Passports Ride the Wave: Accessible via RFID or mobile scan, Pentalym's passport ensures instant access to vital info.

Board's Birth Certificate: Surfboards are registered with a unique RFID tag during production, capturing model, dimensions, materials, and shapers information.

Surfer's Ownership Link: Upon purchase, surfers become proud owners, gaining exclusive access to the board's history and specifications.

Resale Renaissance: Elevate resale value with a delve into the board's history for informed decisions when buying pre-loved boards.

Ownership Verification: Bid farewell to uncertainties with a quick scan confirming authenticity and quality, providing peace of mind.

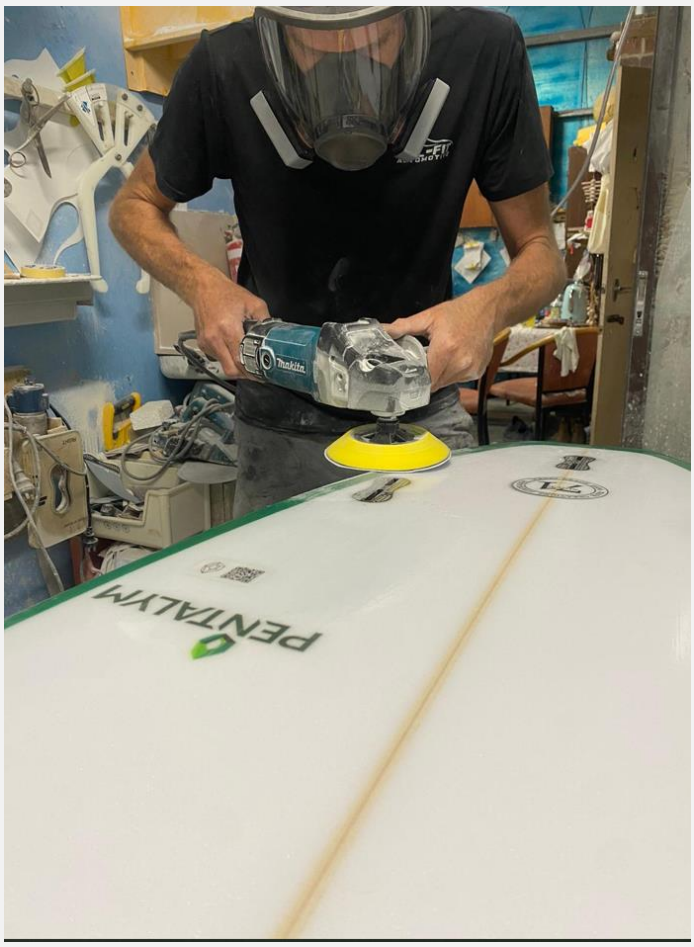
Theft Prevention: Pentalym's RFID smart tag acts as a powerful theft deterrent, uniquely identifiable by digital information. Confirm owner details with a simple scan.

Warranty and Support: Streamlined warranty processes provide peace of mind, with info on environmental impact and sustainable repurposing options.

Ride confidently with Pentalym Surfboard – Tradition Meets Technology!

Maturity level and application sectors

Prototype. Surf industry, watercrafts, recreation, skis, boats, kayak



Useful links:

https://pentalym.com/product/product-overview/

https://pentalym.com/how-we-help/surfboard-user-case/

Tappr

Tappr
Tappr is the equivalent of Webflow or Wordpress for products. We are committed to crafting an intuitive and engaging consumer-facing experiences for products and brands. We make it easy for brands to start building digital product passports themselves or by a team of experts. Three distinctive yet interdependent components form the bedrock of Tappr's offerings, allowing brands to interact meaningfully with consumers, retailers, and other stakeholders. Our Experience Center is a mobile-oriented platform that enables consumers to immerse themselves in your products and brand. Product Cloud is the repository for all product-related data, forming the backbone of our consumer experiences. Meanwhile, Passportbuilder.com is our dedicated online environment where brands and partners are empowered to build and design these remarkable experiences.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		

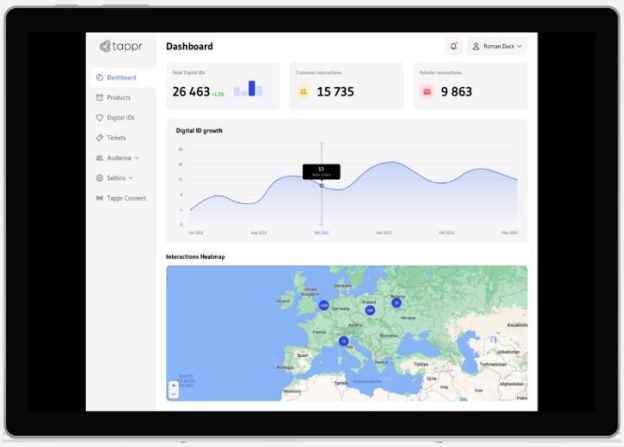
IT architecture: Data use	Labelling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

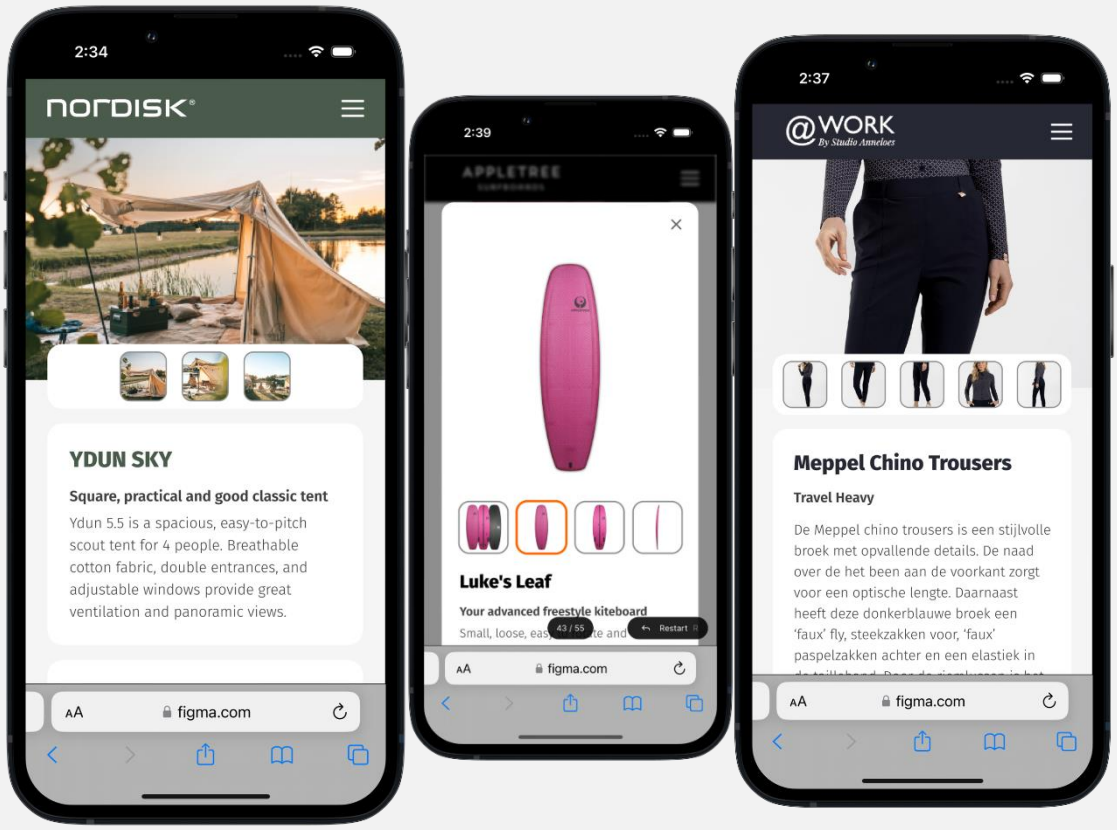
Unique technical aspects

- We offer a fully white-labeled solution, brands can use their branding, and we support custom domain names (e.g., qr.brand.com)
- We have a passport builder that allows brands to tailor & customize their experiences on the fly
- We support many unique features such as Bill-of-material, spare parts, wash instructions, warranty, repair, resale, and circularity programs.
- We are integrated with the larger CRM / marketing automation systems such as Klaviyo, Hubspot, ActiveCampaign
- We are GS1 compliant, and we support both QR, NFC, and Encrypted NFC (NTAG424)
- We are entirely ISO27001 certified and GDPR compliant

Maturity level and application sectors

Our solution has maturity level "Defined". We have a solid client base with promising results that support real-world (business) cases. Our implementation process is mature and we have a standardized project approach. Currently, we are extending our scope with technology & resale partners to prepare for roll-out on a mass scale.





Useful links:

https://usetappr.com/
https://usetappr.com/meeting (book a meeting)
https://passportbuilder.com/ (coming july '23)

TripleR

TripleR
TripleR is a circularity enabler for the mattress industry. Unique single item level identification is achieved via a washable dual tag (QR and RFID) linked to a cloud platform, managing the product composition and all events in the lifecycle of a mattress. TripleR connects all stakeholders: from subcontractors to mattress produces to retail/point of sale to the consumer. Key differentiator is the focus on the end-of-life process: we onboard mattress collectors, refurbishers, disassemblers and recyclers to facilitate end-of-life treatment of the mattress with the goal to increase the level of recycling and move the industry towards circularity. We close the loop! Besides meeting the purposes of Digital Product Passports for the mattress industry, the solution allows various stakeholders to optimize their logistics processes by unlocking the use of RFID. The item level identification allows mattress brands to engage with the consumer.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports	Others	
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IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials	Others		
	Convenience	Wallet		Data Ports	Others		
	Data protection	PETs		Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

We offer a washable dual tag with QR, well known by the consumer, and RFID to optimize industrial operations (inventory movements, shipments, stock control, etc).

Unlike traditional RFID solutions that are linked to local ERP and WMS systems, our RFID is linked to a cloud platform. Various stakeholders connected to the platform can use the RFID, e.g., a subcontractor can scan the RFIDs for goods shipments, and the mattress manufacturer can use this info to scan the goods reception.

Unique item level identification, based on GS1 structure, together with the open API communication of the platform, allows the mattress brand to use the TripleR data in its own after sales processes and systems, creating opportunities for cross- and up-selling.

Maturity level and application sectors

The TripleR solution for the mattress industry is built on the atma.io platform (an Avery Dennison company). The atma platform is already in use by major apparel brands and more than 28 billion items are already managed in the platform.

After some pilot runs in the previous months, TripleR is current onboarding its first customers.

Applications for subcontractors, mattress manufacturers, retail, point-of-sale and consumers are ready. Applications for end-of-life processes (collectors, refurbishers, dismantlers and recyclers) are scheduled for the coming year.

The solution can easily be expanded towards other product segments, and various tag identifiers are being developed.

Stakeholder Map

Useful link:

www.tripler.io

TextileGenesis

Textile Genesis
Textile Genesis is a Blockchain-based platform for the traceability of the origin of fibres for the fashion and textile ecosystem. It includes all 5-6 tiers of the supplier ecosystem, using Fibercoins to trace sustainable textile products from fibre-origin to retail. Fibres such as wood-based.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Convenience	Wallet		Data Ports			Others
	Data protection	PETs		Anonymization			Others
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects
Blockchain-based architecture, highly scalable, using so-called Fibercoins to warrant against double spending. Not only companies that want to produce with sustainable fibres but also third-party auditing bodies have access to verify ESG credentials of supplier's production sites. Thus, the

platform offers a chain of custody for raw materials/fibres (and farm level) from the source throughout the entire value chain. Including fibre forensic audit results. Data is real-time data from different stakeholders.

The platform uses bots for automated business and certificate validations (source: https://textileexchange.org/app/uploads/2021/05/Webinar-Textile-Exchange-and-TextileGenesis-Collaboration-September-2-2020.pdf)

Maturity level and application sectors

Cross-industry platform with a high maturity level, more than 1500 suppliers that create sustainable products have joined Textile Genesis and more than 50 brands in the textile/fashion industry use Textile Genesis to be sure about the origins of the fibres they use. In this way they can show they are using sustainable fibres in their production chain.

Useful links:

https://textilegenesis.com/

https://textileexchange.org/app/uploads/2021/05/Webinar-Textile-Exchange-and-TextileGenesis-Collaboration-September-2-2020.pdf

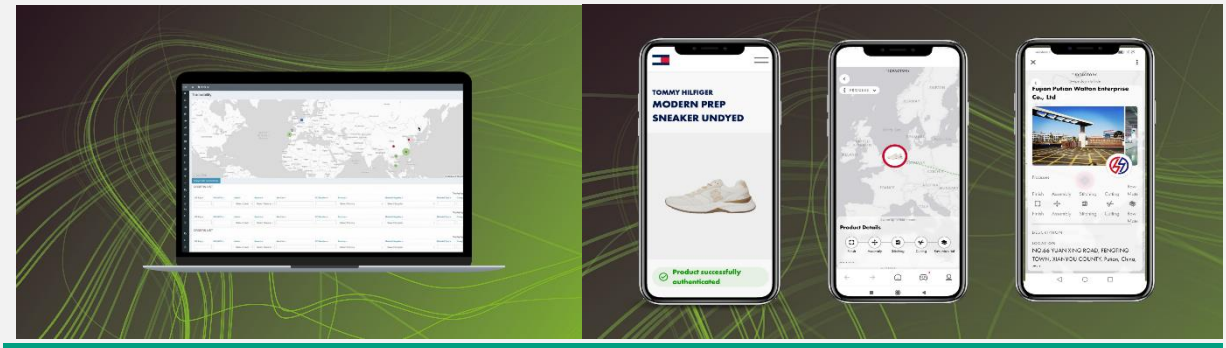
The ID Factory Società Benefit

The ID Factory Srl Società Benefit

The ID Factory is a supply chain traceability platform (SaaS) designed to provide fashion companies visibility across their global supply chains thanks to our digital ID technology.

Our platform contributes to key operations as quality control, compliance, procurement and traceability, by using a dynamic centralized database integrated with any management system:

- TRACKING MATERIAL FLOWS: thanks to an integrated solution enabled by physical traceability of materials, we give insights on suppliers' performance.
- EXTENDING RAW MATERIAL PROCUREMENT: With real-time information for the management of orders, bill of materials, delivery lead time and forecast of orders.
- DIGITALIZING THE QUALITY CONTROL: Chemical and physical compliance of raw materials and finished products with a system that interacts with international labs (Bureau Veritas, UL, SGS, TUV).
- DIGITAL PRODUCT PASSPORT: bolstered by both physical, digital and documental traceability of materials, processes and products.



Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		

IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others
	Data packaging	Data transfer	API		
IT architecture: Access control	**Level**	Simple	Advanced		
	If advanced	Attribute based	Role based		
IT architecture: Data use	Labelling	Enforcement	Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others	
	Convenience	Wallet	Data Ports	Others	
	Data protection	PETs	Anonymization	Others	
	Traceability	Tagging (QR, NFC, RFID)	Others		

Unique technical aspects

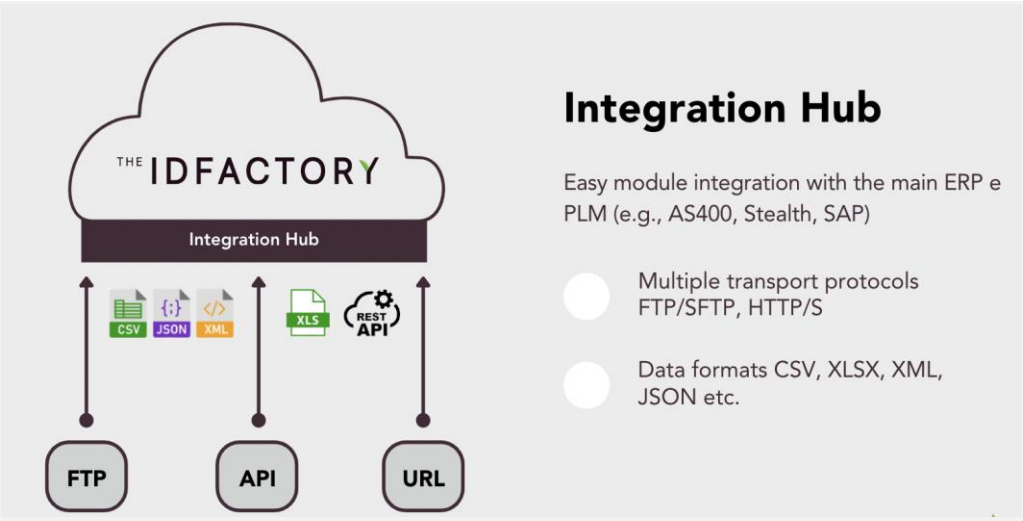
The ID Factory has designed a Traceability Protocol, to set the rules to achieve greater traceability of materials, components and products and to enable a systematic and scalable data collection system along the fashion and luxury supply chains thanks to a joined digital, physical and documental traceability framework that leverages on the experience of the existing traceability standard of the industry.

We have created a mixed method for our framework:

Physical traceability through Smart-Tag labels applied to the single component or material piece, linked to the respective batch and order, enriched with the information collected through the whole production processes.

Documental traceability through the direct engagement of the supplier as data owner: direct upload of the documents on a shared data repository, a platform on cloud in our case, where each material certificate is linked to the production order and divided by product category.

The ID Factory is also ISO 27001 certified.



Maturity level and application sectors

In strategic collaboration with Sopra Steria, a world-leading system integrator, we have enhanced our capabilities and seamless implementation with the existing fashion brand management systems.

As an active participant in the Innovation Forum of the Global Fashion Agenda (GFA), The ID Factory contributes to shaping sustainable fashion practices. This coveted membership showcases our commitment to fostering innovation and traceability, positioning us at the forefront of industry transformation.

We have been recognized among the innovation provider solutions listed by the Bocconi Monitor for Circular Fashion study and as part of The Fashion for Good DIGITAL TRACEABILITY PLATFORM ANALYSIS that evaluates The ID Factory fashion readiness as 5 out of 5 with a high maturity level.

The ID Factory stands as a mature and trusted leader in traceability, empowering brands and stakeholders with our innovative Digital Product Passport solution focused on supply chain traceability and transparency.

Useful links:

TRACEABILITY PROTOCOL
INNOVATION FORUM GFA
BOCCONI MONITOR FOR CIRCULAR FASHION: Link 1, Link 2
FASHION FOR GOOD REPORT TRACEABILITY PLATFORM

Tilkal

Tilkal
Tilkal is the Supply Chain Traceability & Transparency Platform for Industry 4.0. It combines a unique B2B blockchain network for secure and provable data sharing, with analytics and scoring algorithms to create an end-to-end, real-time representation of the supply chain. Industrials and brands use Tilkal to track their products, identify their sourcing risks, prove their ESG commitments and demonstrate their compliance. For our clients, we provide DPPs backed with verifiable operational data at product/item/batch level, whether it is to meet a transparency challenge vis-a-vis end customers (B2B or B2C), or to be compliant with current and future regulations.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
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IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)		Others			

Unique technical aspects

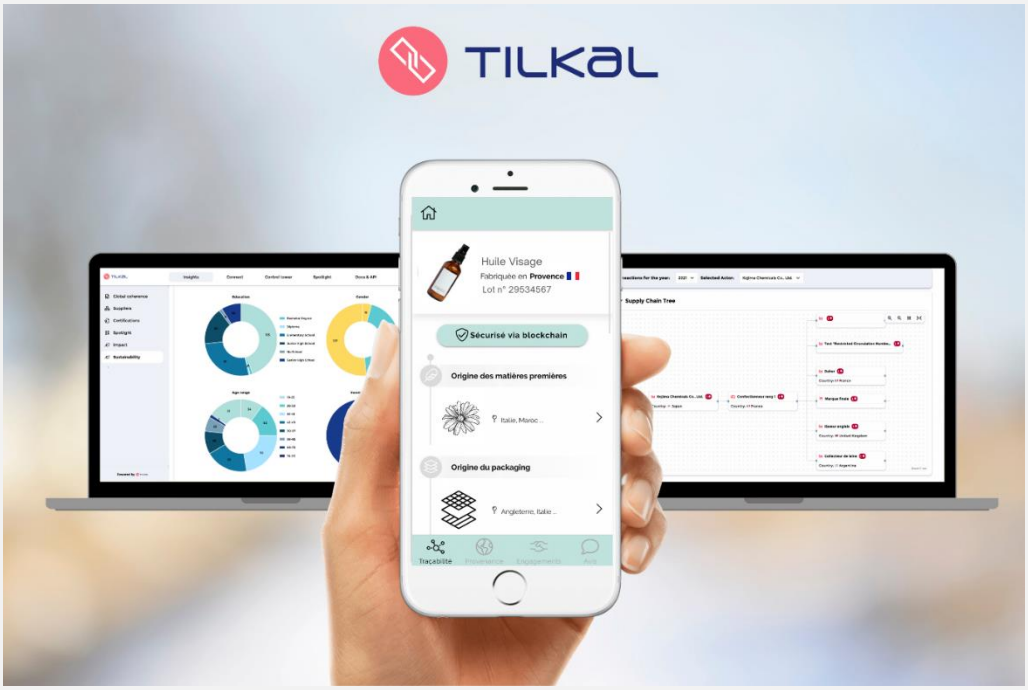
Tilkal's Traceability & Transparency Platform is based on:

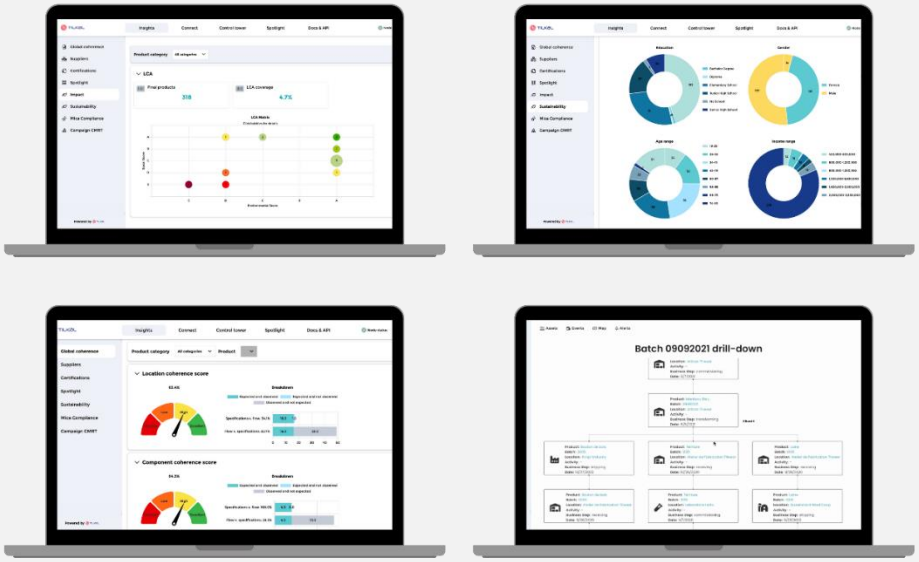
a) an independent B2B blockchain network focused on supply chain for secure and auditable data sharing, as well as accountability between stakeholders
b) our versatile data model that aggregates all supply chain and ESG-related data, on any type of product or component
c) a unique risk assessment & AI-based due diligence intelligence to verify compliance in real time for each supplier, product, category, batch, collection or unit (real-time end-to-end supply chain monitoring and analysis, anomaly detection, reports, alerts, KPIs)

Maturity level and application sectors

Tilkal has clients across global value chains and in various industries, with use cases ranging from ensuring ethical sourcing, to tracking products, demonstrating compliance, or offering transparency to end customers through Digital Product Passports.

Among them are Danone for the traceability of infant milk in China and the sourcing of plant-based milks in Europe, Daher for the traceability of conflict minerals as well as for customs compliance on raw material imports, Joone for radical transparency on more than 200 cosmetics and hygiene products, or the NGO Responsible Mica Initiative for the analysis of the mica sourcing flows of 100 manufacturers in order to fight against child labor.





Useful link:

www.tilkal.com

Tings

Tings						
Responsible operator and consumer focused product lifecycle support system. Durable goods and apparel. DPP ready.						
Mapping with respect to the reference framework						
Product ID	**Type**	Instance		Category		
	Granularity	Model	Batch	Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No		
	Resolver	Yes		No		
Digital connector	**ID minting**	Centralized		Decentralized		
	Data storage location	Centralized		Decentralized		
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	Data packaging	Data transfer		API		
IT architecture: Access control	**Level**	Simple		Advanced		
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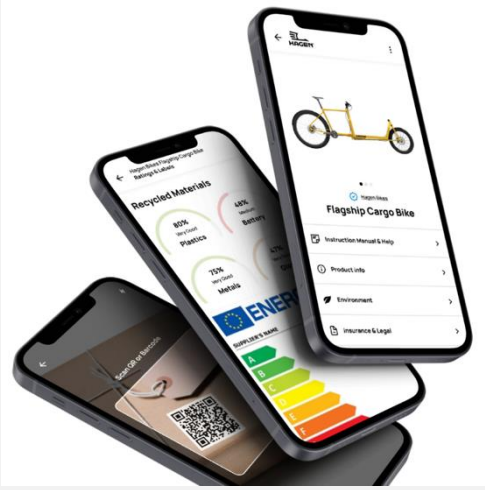
IT architecture: Data use	Labelling	Enforcement		Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others		
	Convenience	Wallet	Data Ports	Others		
	Data protection	PETs	Anonymization	Others		
	Traceability	Tagging (QR, NFC, RFID)		Others		
Unique technical aspects						
Support for different taxonomies by using mapping capability.						
Maturity level and application sectors						

Closed MVP with users. Cross-sector. Designed to fit with DPP data and data system if similar to ESPR and CIRPASS proposal described DPP will be decided. Before DPP enforcement offers responsible operators to make as much product data digitally available as possible for consumers to use products more responsibly, extend product consumption period, support products taken to upcycle and recycle. Currently uses based on guesswork DPP data set. System supports more data and functionality from responsible operators to consumers than predicted for DPP.



Trackit

Trackit Traceability Programme and Shared Measurement System

Trackit is a technology agnostic traceability program developed based on a set of open materials, processes and product standards that are widely adopted by the textile sector, to trace certified fiber and raw materials across the textile supply chain from source to product. It currently leverages our chain of custody, the Content Claim Standard, to trace third-party certified materials across the supply chain. Trackit centralises site-level verification and offers two alternatives to transaction verification:

- dTrackit allows certification bodies, brands and suppliers accredited/certified to our standards to access their scope certificates, transaction certificates, and traceability data in one central place.
- eTrackit uses new technologies to increase efficiency and integrity in traceability. It tracks the volume of certified material for each product (rather than the entire transaction) online via tokens, shows real-time inventory, and ensures peer-to-peer validation of transactions within a closed-loop supply chain.

Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

1. **Third-party verified.** Trackit data are third-party verified by certification bodies that are independently accredited by accreditation bodies to ISO 17065.

2. **Modern data architecture.** Trackit is developed as a part of Textile Exchange's Shared Measurement System ("SMS", see video), a modern data architecture set up to track and measure the fashion, apparel and textile sector towards the Climate+ goals.

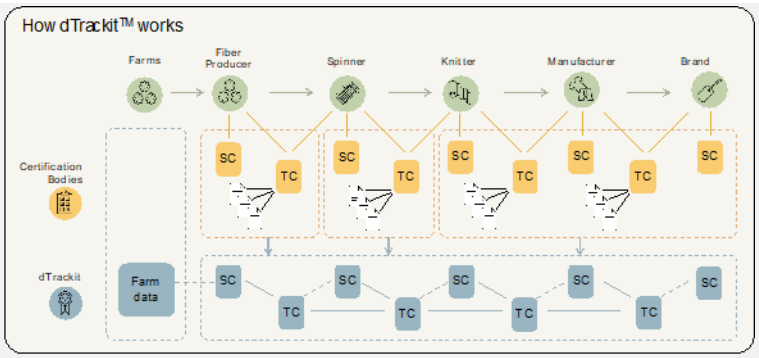
3. **Open data standard.** Trackit leverages a suite of growing open data standards that Textile Exchange developed in consultation with and for the standardised reporting of the fashion, apparel, and textile sector.

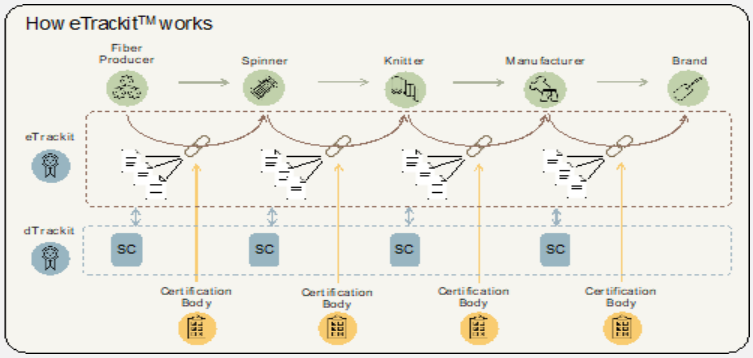
4. **Mission based.** Trackit data is securely stored and governed centrally by Textile Exchange (a U.S. based 501(c)(3) not for profit with a mission to accelerate and scale global fiber and materials production that positively impacts our planet) as a single source of truth for traceable certified materials.

Maturity level and application sectors

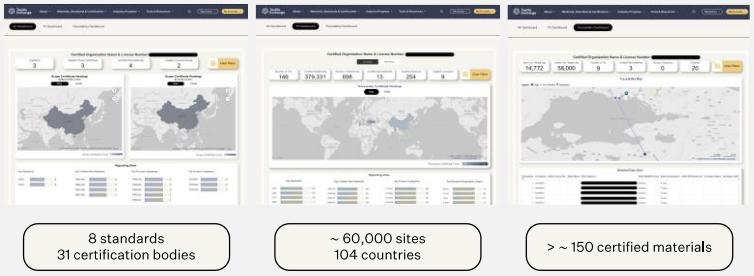
dTrackit is operational across 30+ certification bodies, 60,000+ sites in 104 countries for 150 certified materials in organic, recycled, responsible wool, alpaca, mohair and down. This service will be extended for producer-level schemes to trace certified materials from source to product, and there is potential for site-level schemes to connect facility certifications to existing chains. As the source of truth for certified materials across six key categories in the textile sector, discussions are also underway with technology solution providers to validate the certified materials and/or facilities in their system. Access to dTrackit is based on roles: public, brand, supplier, producer, and certification body. Public access to certified listings and transaction authentication was released in November 2022. A general release is expected in the coming months. Certification body access is planned in 2023, and supplier, producer access in 2024.

eTrackit pilot for the Recycled Content Standard and Global Recycled Standard eTrackit was completed in August 2022. We are expecting to release the Recycled Content Standard and Global Recycled Standard for commercial use on eTrackit in July 2023. We will be piloting the Organic Content Standard and the Responsible Animal Fibers in June 2023 and Responsible Down Standard in 2024.

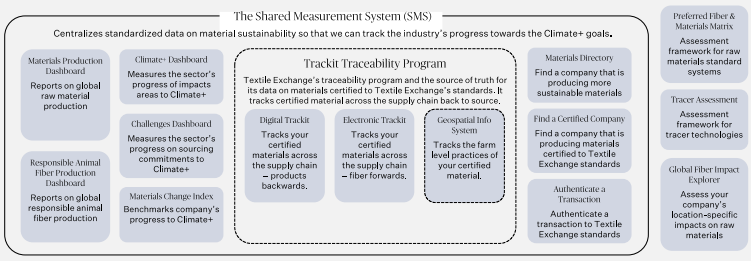




Digital Trackit™



Textile Exchange's Digital Tools



SMS tools:

- Climate+ Dashboard, - Materials Production Dashboard, - Materials Change Index, - Materials Challenges Dashboard

Useful links:

Trackit & SMS Presentation ; Trackit video ; Trackit web page ; dTrackit web page ; eTrackit web page ; Shared Measurement System video ; Climate+ Vision ; chain of custody ; Content Claim Standard ; Open data standard example - Materials, Processes & Products Classification

Worldline TCS

Tax Control Suite (TCS)							

Worldline excised stamp and track and trace solution, so called product name Tax Control Suite:

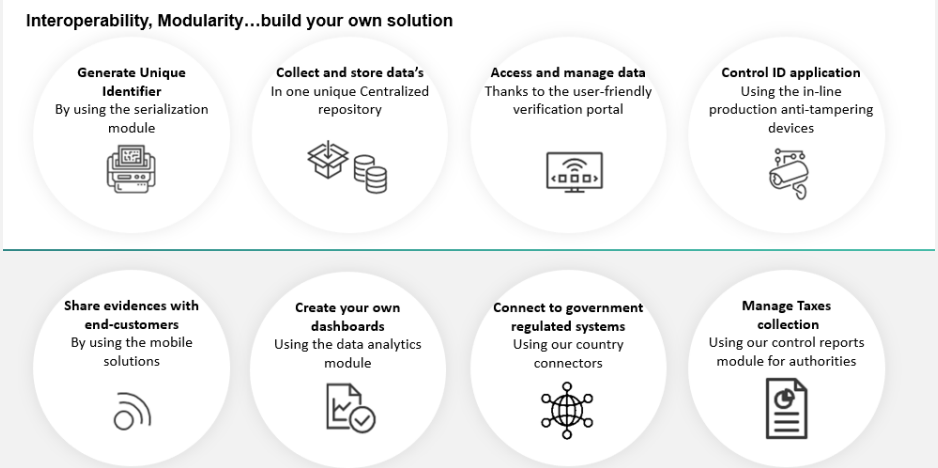
- Is a digital tool for control and monitoring of all excised goods, manufactured or imported into a market, territory or country (near real time visibility with our mobile app);
- Destined to fight illicit trade with less admin burden;
- Increases the revenue for the authority's administration due to the tax collection monitoring;
- Fully compliant with existing international and/or local regulation;
- State-of-the-Art: customisable, interoperable with existing IT systems and leading edge technologies;
- Supporting digitisation and international recognition.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain			Verifiable Credentials		Others
	Convenience	Wallet			Data Ports		Others
	Data protection	PETs			Anonymization		Others

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

Worldline Tax control suite is a modulable solution to be composed with components that would suit with local authority's needs.



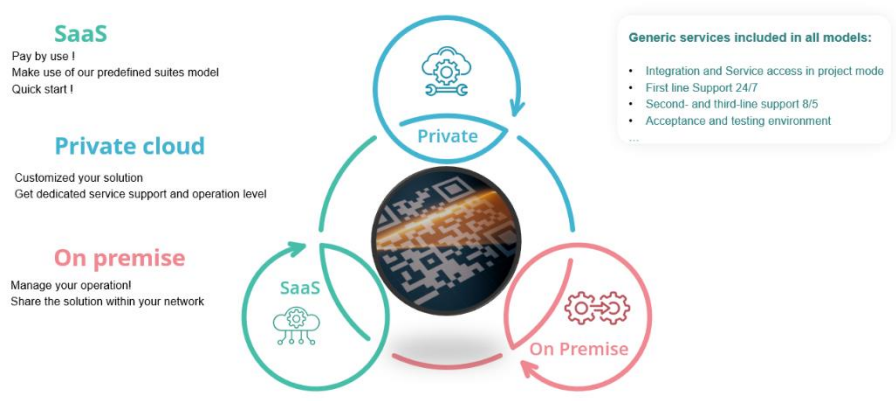
The core components are:

- Portal to register the economic operators (including registration of related master data such as information around their facilities, their machines, etc.).
- Portal to enable the order or generation of Unique Identifier to be applied on product to be traced.
- Event repository to control and store the product tracking related events sent by the manufacturers along the product life cycle. The events may cover production processes as well as logistic operations.
- Machine to machine integration thanks to API managing the operations directly from the system of the manufacturers.
- Additional modules could be:
- Statistics and reporting module to provide to the authority a full market or industry related report.
- Mobile application to provide easy access to evidence or control tools.

In addition to the Worldline Tax Control suite which is a fully digital solution, Worldline has strong partnership with the best specialists to provide additional features that would enhance the verification and control of traceability notions:

- Anti-tampering hardware devices to control unique code application on production lines:
- Physical tax stamps design lay-out, printing and supply facilities and;
- New security features technologies.

Worldline may propose a flexible delivery model of the Tax Control Suite. From acting as a global and dedicated service provider to a simple solution provider operated on local premise.



Maturity level and application sectors

Solution used to control tobacco industry in different versions.

- Digital Tax Verification in Switzerland;
- Unique Identifier generation and economic operator registrations in Denmark, Lithuania, Greece, Cyprus, The Netherlands;
- Tax control and import management in Ecuador.

Useful link:

WL Traceability for Authorities - YouTube.

Worldline TPD

TPD Repositories

Worldline is deeply involved in the Track and Trace activities linked to the European Regulation for tobacco manufacturers and importers and for local and European authorities.

The European Regulation (TPD and Implementing Acts) helps European authorities to fight against tobacco illicit trade by tracking all tobacco products in the European territory.

Worldline provide one stop shop solutions to EU economic operators and EU member states allowing them to comply with the regulation, for example the primary repository for importers and manufacturers of tobacco products. When necessary, Worldline also provides to its customers other ancillary services such as private repositories and connectivity modules to further secure the compliance with the regulation.

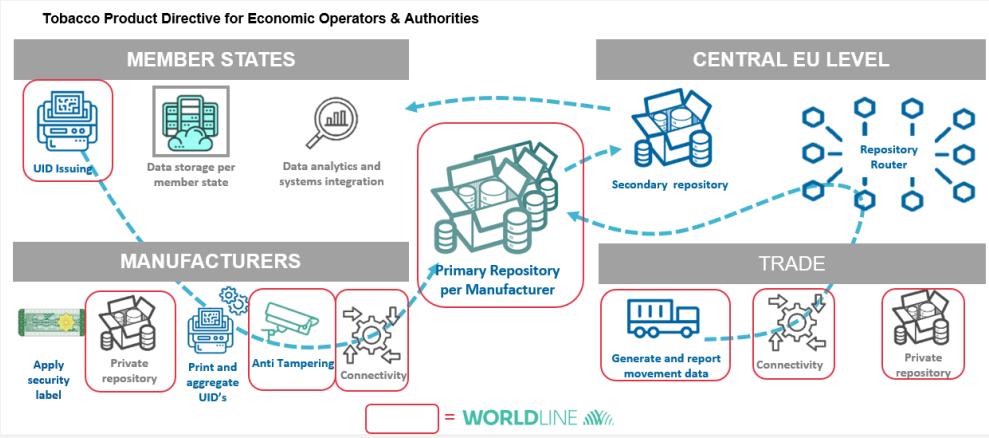
Mapping with respect to the reference framework

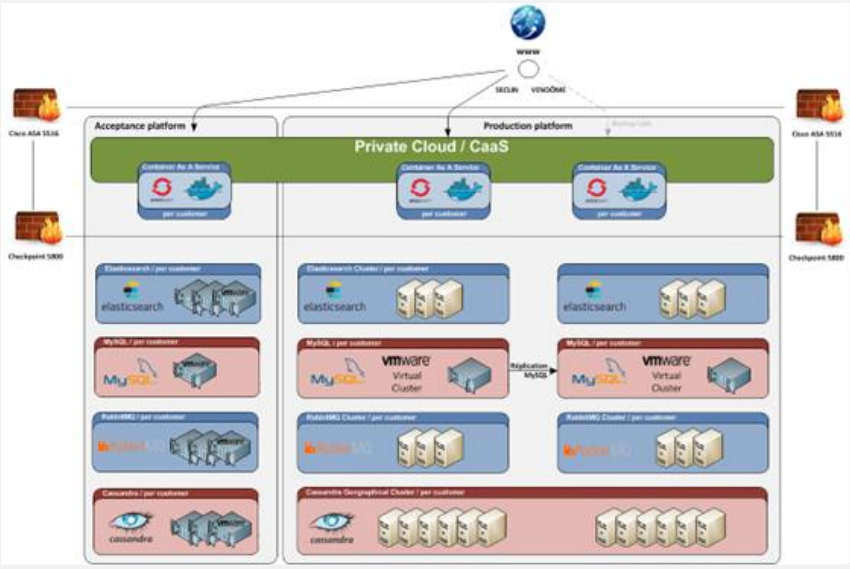
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	

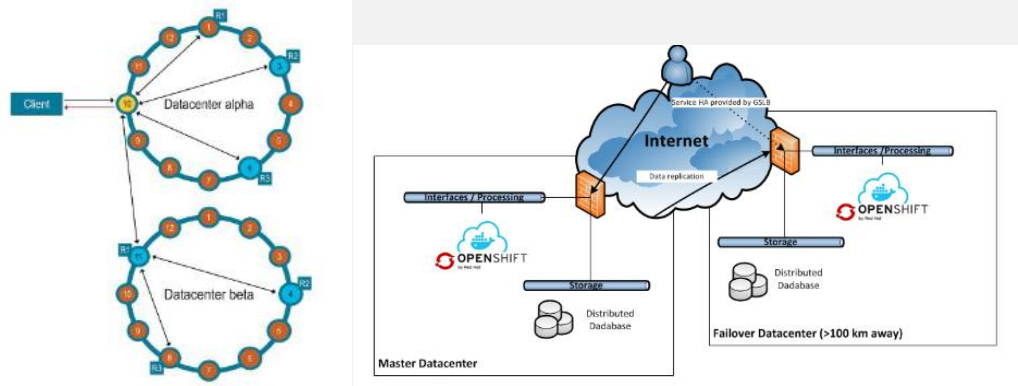
Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

In order to ensure business continuity and no loss of data as per EU regulation, Worldline implemented on their private cloud infrastructure a fully redundant platforms architecture using different data-centres (active and passive). This architecture allows an instant platform switch in case of major disaster. All used technologies are fully redundant at several levels (Openshift and CaaS management, MySQL management, Elastic stack and RabbitMQ, Cassandra storage, WebDAV and Webscale).







Maturity level and application sectors

Worldline is operating 6 regulated primary repositories and 5 manufacturer centralised Track and Trace systems since 2019 to support to EU tobacco product directive implementing regulation.

This is representing the management of:

- 25 billion unique products traced a year;
- 100 billion of product related tracking events a year and;
- 30 Terabytes of data processed and stored a year.

TRACE

TRACE							
TRACE is a web-based platform functioning as an established approach to collect ASM traceability data to ensure chain of custody documentation, transparency on contamination risks and provide traceability reports and export documentation to our clients							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
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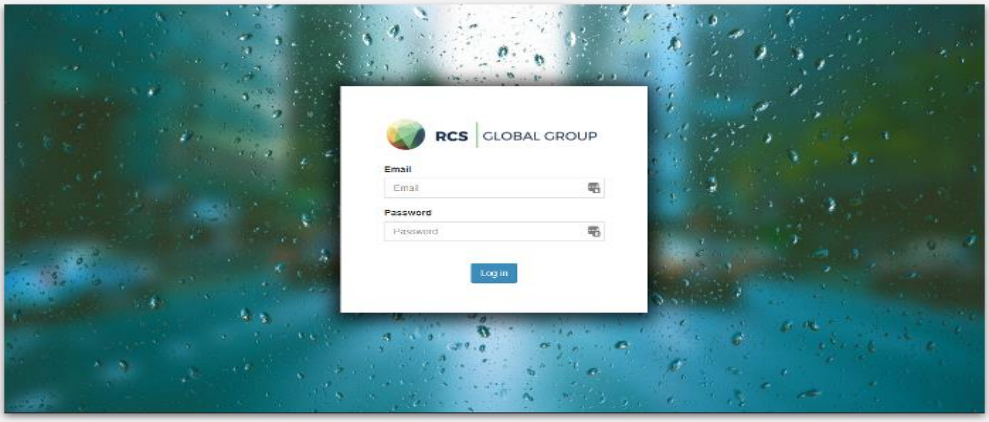
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		
Unique technical aspects							
The tech solution is in production since 2019, TRACE 2.0 will adopt a miro-service architecture to ensure agility, improved traceability, easier debugging and maintenance. This will be based on a							

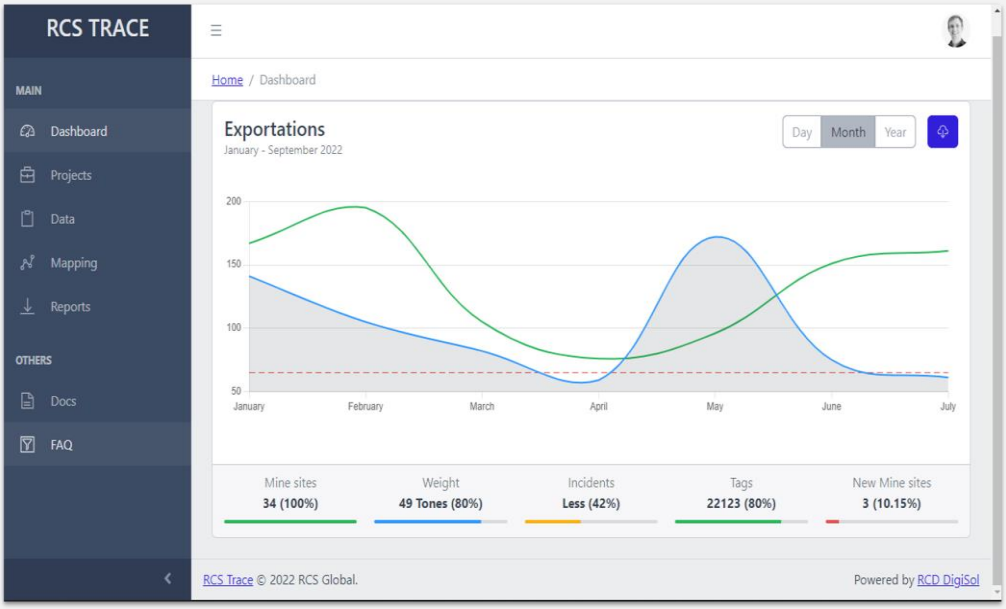
cloud formation infrastructure on AWS to enhance security, quality, maintainability, and data integration. Possible tech stack could be based on Elixir with PostgreSQL DB.

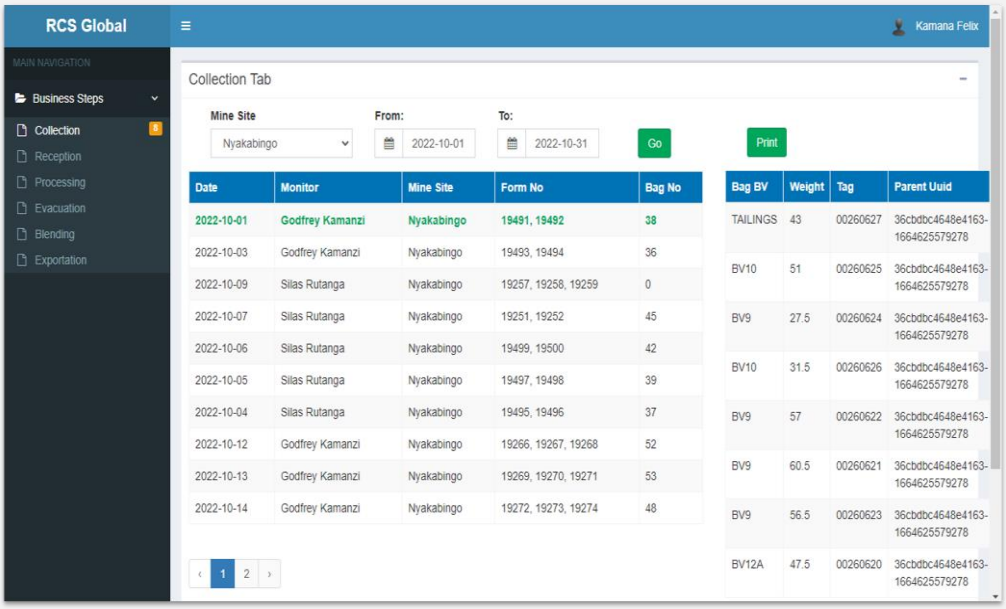
Maturity level and application sectors

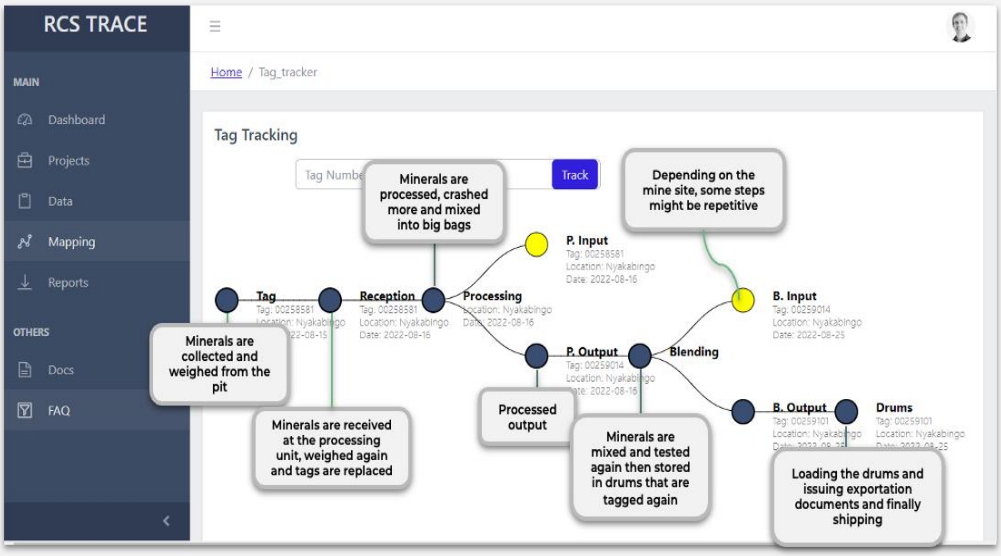
TRACE version 1.0 was launched in 2019, current work is on TRACE 2.0. TRACE is used by RCS clients to trace monitored ASM material from pit/ tunnel to export, with potential expansion to extend traceability to cover the entire value chain.

Note: the dataset used for demonstration is a dummy one









Useful link:

https://www.rcsglobal.com/trace/

TRICK

TRICK
Product data TRaceability Information management by BloCKchains interoperability and open circular service marketplace. TRICK Project arises from the need from the Textile and clothing industry to be more transparent and traceable, easing the transition from linear to circular. The TRICK project consists of providing a complete, reliable, SME-affordable and standardised platform to support the adoption, tracing and demonstration of sustainable and circular approaches, secured by Blockchain enabling the enterprises to collect product-secured data. TRICK's main goal is to provide affordable and standardised enablers to move SMEs closer to a circular economy. The achievement of this objective will come through the creation of a platform for the management of circular product information based on data collection and secured by Blockchain. The TRICK platform will perform the collection and data management of secure product data all along the supply chain together with a set of six services available in an open B2B marketplace.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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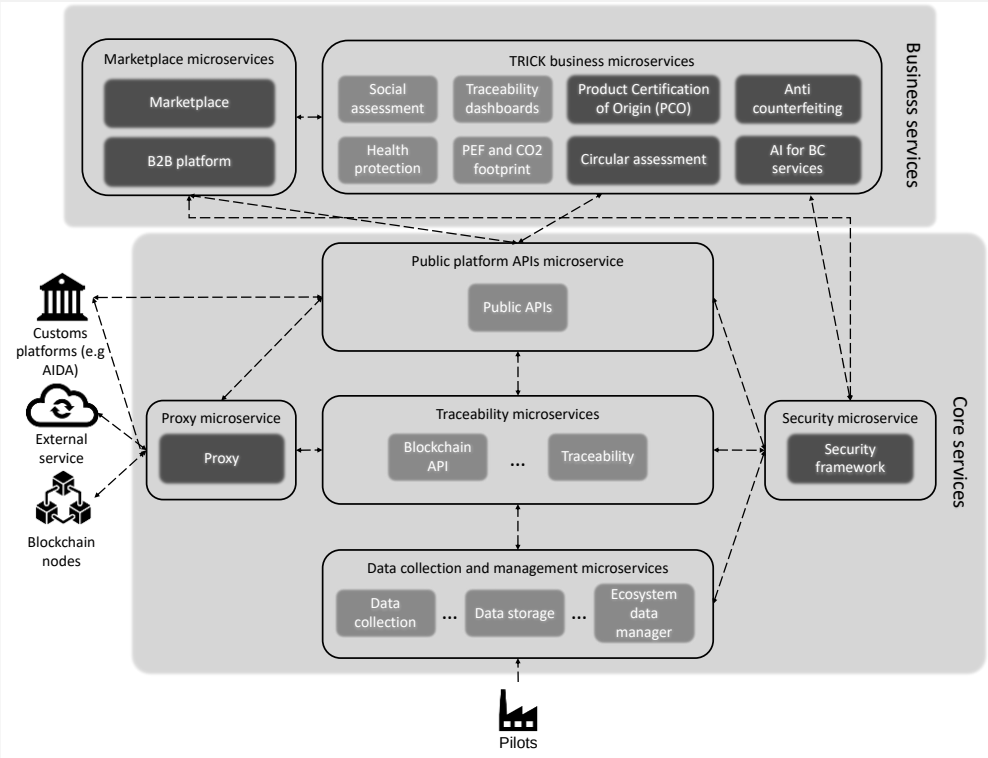
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials		Others		

Data mgmt features	**Convenience**	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others
Unique technical aspects				

Typically, the modern IT platform architectures are based on several services, i.e., data storage, database, core services to perform specific functionality. The micro-service approach, proposed in TRICK, uses loosely coupled, collaborating services to enable rapid development and deployment and adoption of simple communication protocols, synchronous or asynchronous. The figure depicts TRICK microservice architecture where data coming from end users is collected and managed by a set of microservices (e.g. data collection, data storage and ecosystem data manager). Traceability micro-services are responsible for managing data stored in the blockchain and to implement the traceability functionality. The basic functionalities, provided by core services are exposed by public platform APIs micro-service. This service is the touch point among the core services, the marketplace, the business services and B2B platform. The business services offered by TRICK platform are: social assessment, health protection, traceability dashboards, PEF and CO2 footprint, Product Certification of Origin (PCO), circular assessment, anti-counterfeiting, AI for BC services. In the proposed approach, each business service is a microservice. By following the same approach, marketplace microservices contain this application and B2B platform. The goal of B2B platform is to offer access directly to TRICK public APIs to build external application based on TRICK services.



Maturity level and application sectors

Considering the technical aspects of the TRICK platform traceability and PCO as core of the TRICK solution are on a good maturity level. The smart contracts have already been implemented to be used on the Blockchains both public and private.

The TRICK platform is addressed specifically for the textile sector which end users are represented on the project consortium covering the whole textile value chain for both technical and fashion textiles. The solution will be validated by the textile industrial users on two pilots and a replication for the food sector, as well represented on the project.

Useful Link:

https://www.trick-project.eu/

TrusTrace

TrusTrace
Supply chain transparency and product traceability SaaS platform for global fashion and retail brands. TrusTrace is a leader in fashion supply chain traceability. Our SaaS technology empowers brands and suppliers around the world to standardize how supply chain and material traceability data is captured, digitized and shared. With all trusted supply chain traceability data stored on a single platform, brands get the right evidence in the right place to back-up product claims and meet regulatory compliance. Trustrace is based in Stockholm, Sweden, with offices in India (Coimbatore), France and the US. We currently have a 100+ strong team and solid experience in delivering large scale traceability programs.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	

	Traceability	Tagging (QR, NFC, RFID)	Others

Unique technical aspects

Trustrace is SAAS platform which is built for scale. And configurable for multiple use cases. We have ultra large fashion brands recording millions of transactions per month. Platform includes Extraction Framework (OCR) over 80% accuracy Entity Customization (Extending any entity without code). Data warehouse for analytics (Includes Power BI). Integrations with Rest API and Excel. Event triggers (webhooks for brands).

TrusTrace's technology stack and automation is ISO 27001 certified which means it meets rigorous information and data protection standards with its information security practices keeping user data secure.

Maturity level and application sectors

Trustrace was founded in 2016 and is currently a trusted traceability solution provider for more than 45 Brands. TrusTraces core customer are global enterprise scale fashion and retail brands such as Adidas, OTB and Fast Retailing. Trustrace operates worldwide with most customers in Europe and the US.

Trustrace already has a small version of the Digital Product Passport i.e.:

https://m.trustrace.com/product/Residus/en/CYRIL-DRESS/product-journey

TrusTrace is leading the textile group for the development of the DPP in Sweden under the Trace4Value project, where we are also testing RFID technology as well as looking into the use of resolvers: https://trace4value.se/

Trustrace has recently launched the Traceability Playbook as an industry initiative:

https://trustrace.com/traceability-playbook-fashion-supply-chains

Twintag

Twintag							
Twintag is an all-in-one connected products platform, bringing digital information and workflows to physical products and assets. All with a single scan of a unique (QR) code. Access this wealth of information with any smartphone; no apps or accounts required. A product becomes a single, bidirectional point of contact for everything from product manuals, logistical flows, safety and transparency information to services such as repair, recycle, reuse, maintenance and support. It is essential to understand that the same product tag can serve an unlimited number of flows and experiences, conducted by an unlimited number of personas. External parameters such as time and location can fully drive the function and UI. Most solutions typically start with a simple value proposition and evolve over time as driven by user feedback.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model		Batch	Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

Twintag fully embraces today's polyglot world. We offer our own proprietary APIs that optimize for developer friendliness. In addition, we offer support for a variety of standards and connectors to a diverse range of data management and other IT systems. In the same vein we offer our own UUID based IDs as well as support for GS1 Digital Link and bring-your-own-ID.

Finally, we offer an all-in-one solution from a fully managed SaaS platform for hosting the digital data and experiences behind each code, to customization services and even the physical tagging of products via our partner network. This includes a comprehensive language and text framework where all application texts can be maintained and new language options created, while the UI will default to the detected platform locale.

Maturity level and application sectors

Fully operational solution (TRL9), faithfully serving industry leading enterprise customers such as ExxonMobil Chemical, Katoen Natie, Equans, Kiwa, Tricorp - manufacturing and/or servicing millions of products/assets. We're active in a diverse set of industries from petrochemicals, rental services, industrial manufacturing, and textiles to furniture and mattresses.

Recent R-Cycle Digital Product Passport project for certified circular packaging, which Twintag developed together with ExxonMobil, Reifenhäuser and Comexi:

Recent Digital Product Passport initiative enabling circularity in workwear that was started up at workwear company Tricorp, in collaboration with Twintag's partner EE Labels, a label manufacturer with in-house capabilities to weave serialized QR codes:

The underlying rationale for our customers, and thus of the Twintag value proposition, is to realize multiple strategic business outcomes through the same unique digital twin - or “twintag” - of their product:

Useful links:

https://twintag.com
https://twintag.com/customer-stories
https://www.katoennatie.com/twintag

Twinu

Solution Name: twinu GmbH							
Twinu's circularity solution for Digital Product Passports helps companies to measure and improve the circularity of their products. The Circular Pass gives each product a digital twin on the blockchain which can be used to improve the functionality, convenience, and safety of the product, extend its lifetime and usage, and build a closer relationship with the customer until the product is collected and recycled at the end of its lifetime.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
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	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

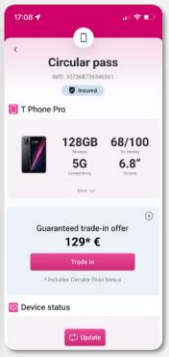
Unique technical aspects

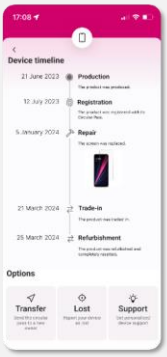
The solution consists of three core elements: The Circular Pass of the product, a B2B product suite including dashboards and management tools to measure and improve a company's circularity as well as B2C apps to give end-users access to information and functionalities of the Circular Pass.

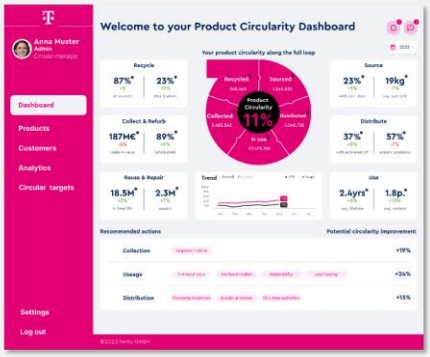
Twinu's Circular Passes are being built as Digital Twins of the product using semantic web technologies (knowledge graphs) which help to make the products information machine-readable and understandable. Additional AI/IoT use-cases can be built efficiently and effectively on-top. Examples are available Voice- and IoT apps to access and control products via their Circular Pass. The Circular Pass is minted as a semantic Digital Twin on the blockchain to create uniqueness and clear ownership. To link and connect products with their Circular Pass an innovative patent has been developed and registered.

Maturity level and application sectors

Twinu's circularity solution has been tested and piloted successfully, for example for smartphones, furniture, fashion. Other application sectors are industry appliances where the Circular Pass also serves as maintenance & service pass to track history of an appliance. Twinu's solution got awarded as the "most sustainable solution" by two large telecommunication providers.







Useful Link:

www.twinu.com

UNISOT

UNISOT

Nordic Textile DPP powerd by UNISOT. Nordic Textile provides a DPP solution to all customers in the textile industry both big and small. While DPP compliance is mandatory, the solution (UNISOT) goes beyond the basics. The UNISOT Smart Digital Product Passport extends the required DPP with additional functionality designed to enhance Consumer Engagement:

- Live Information
- Customer communication
- Channel Feedback
- Quality Control
- Loyalty

These tools facilitate real-time communication, gather valuable feedback, and reward loyal consumers, fostering brand loyalty and trust. The solution provides end-to-end traceability, allowing brands to track their products from raw materials to the retail shelf. This aligns perfectly with the EU's emphasis on transparency and the Digital Product Passport. Moreover, the platform's focus on sustainability ensures that brands can showcase their commitment to eco-friendly practices, aligning with the EU's vision for recyclable and reusable textiles.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
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	Resolver	Yes			No		
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IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		

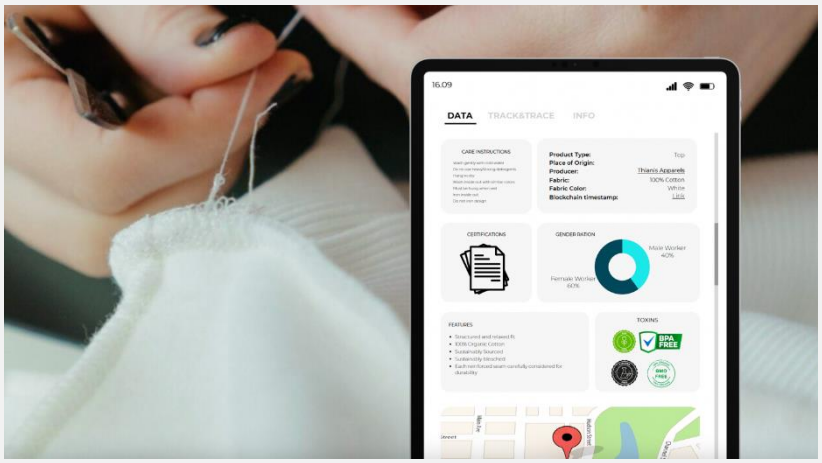
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

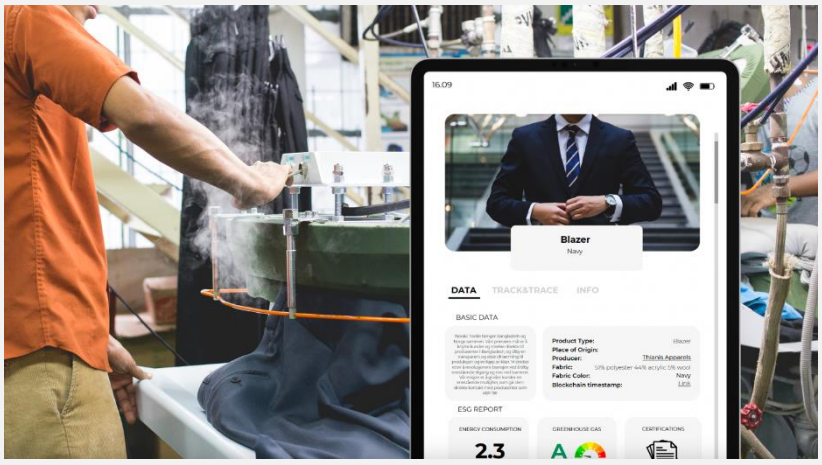
Unique technical aspects

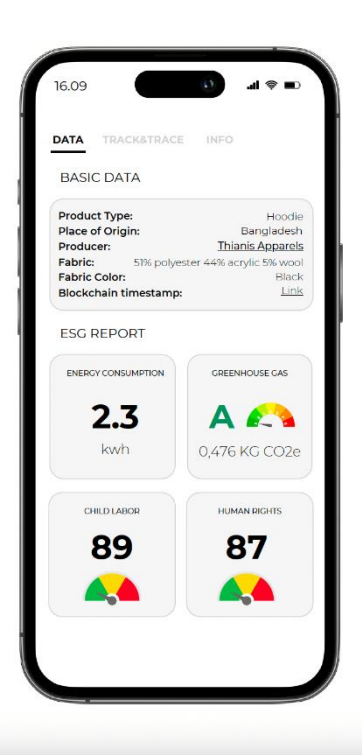
Open blockchain

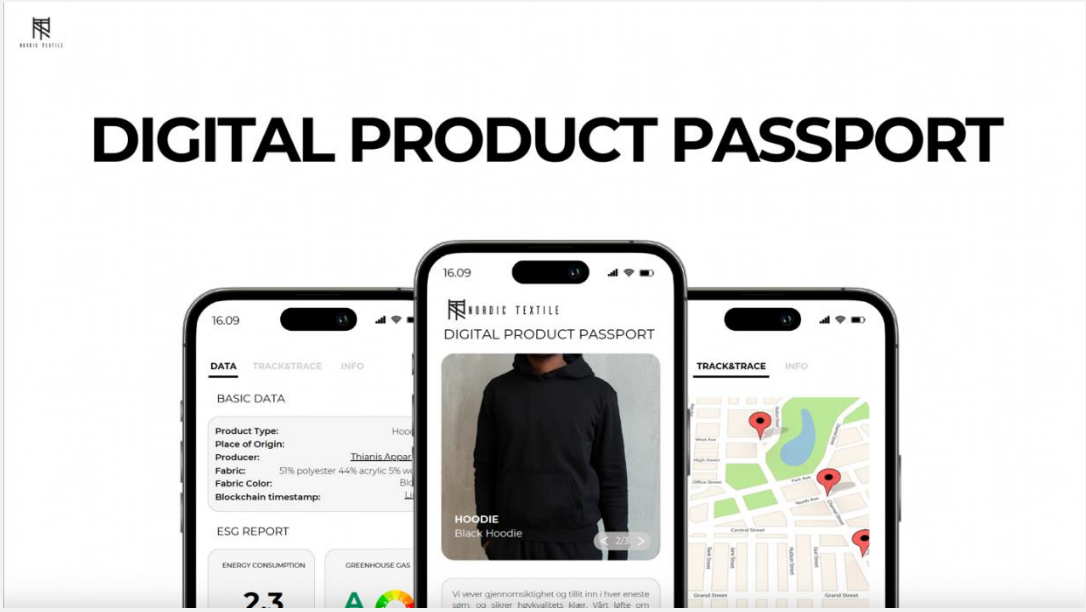
Maturity level and application sectors

High maturity and fully implemented and applicable for Textile, Sea food, Agri and Food and beverage sectors.









Useful links:

www.Nordictextile.no

unisot.com

Vine

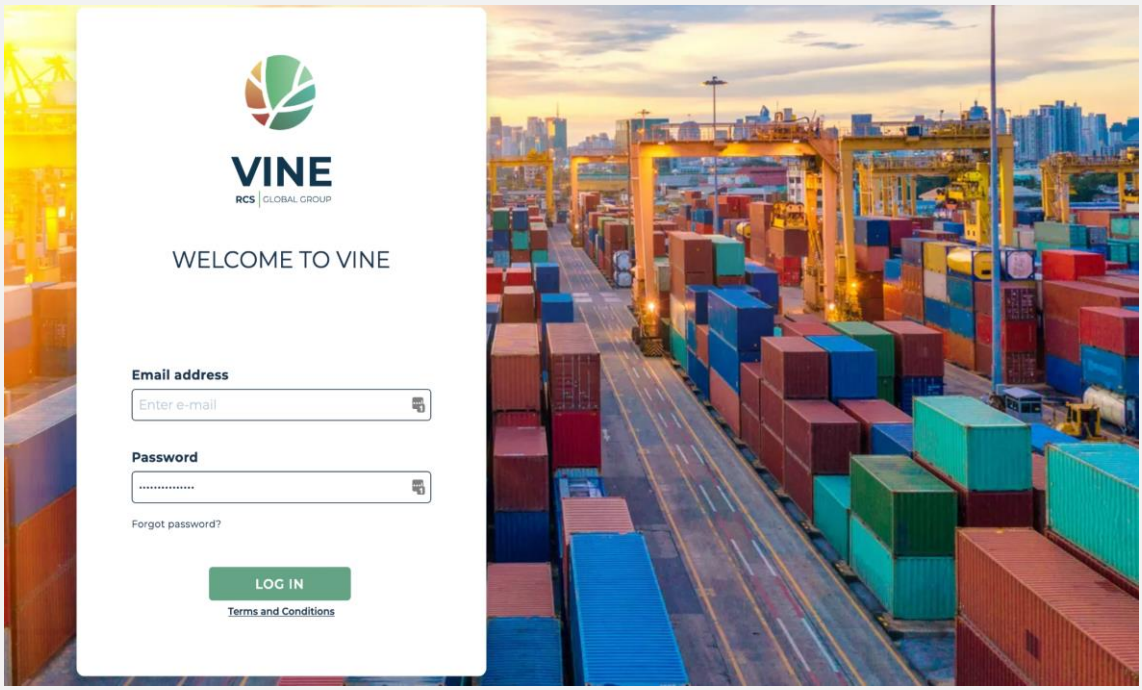
VINE							
Vine is a Cloud based Platform for Supply chain visualisation, ESG & DD performance management, audit programme overview and supply chains risk mitigation.							
Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			
	Data protection	PETs	Anonymization	Others			
	Traceability	Tagging (QR, NFC, RFID)		Others			
Unique technical aspects							
At the moment Vine is a cloud platform hosted on Heroku, using Elixir with Phoenix framework and LiveView as core for the backend and also Javascript (AlpineJS) and GraphQL, all connected to PostgreSQL DBs. As the system is constantly scaling and expanding some of the elements of tech stack and architecture could be updated in Q1-2 to provide better performance and security for							

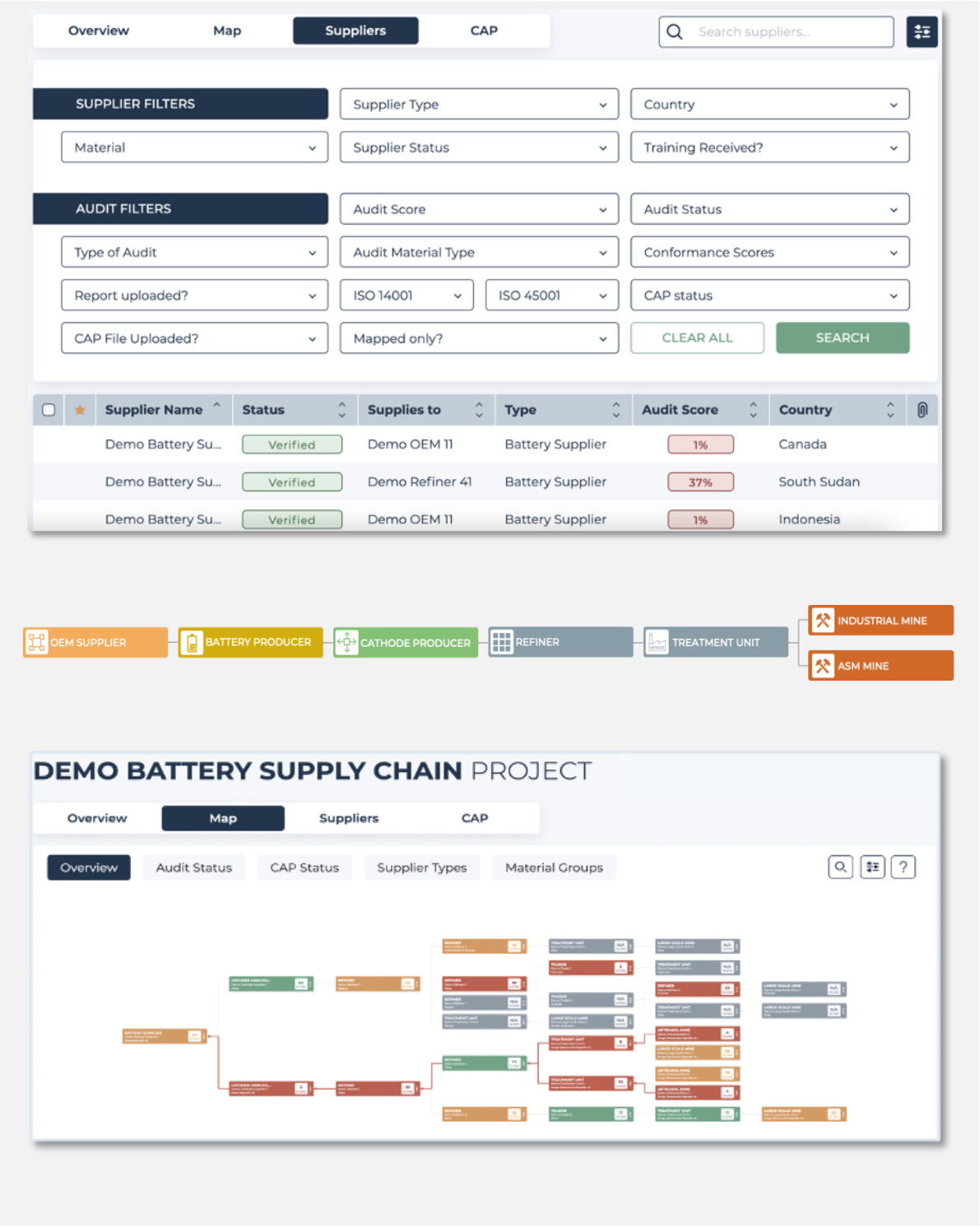
more mature products and allow future scaling. Part of Vine is customised fork of Balkan library that was optimised towards supply chain mapping and could be regarded as a unique technical solution.

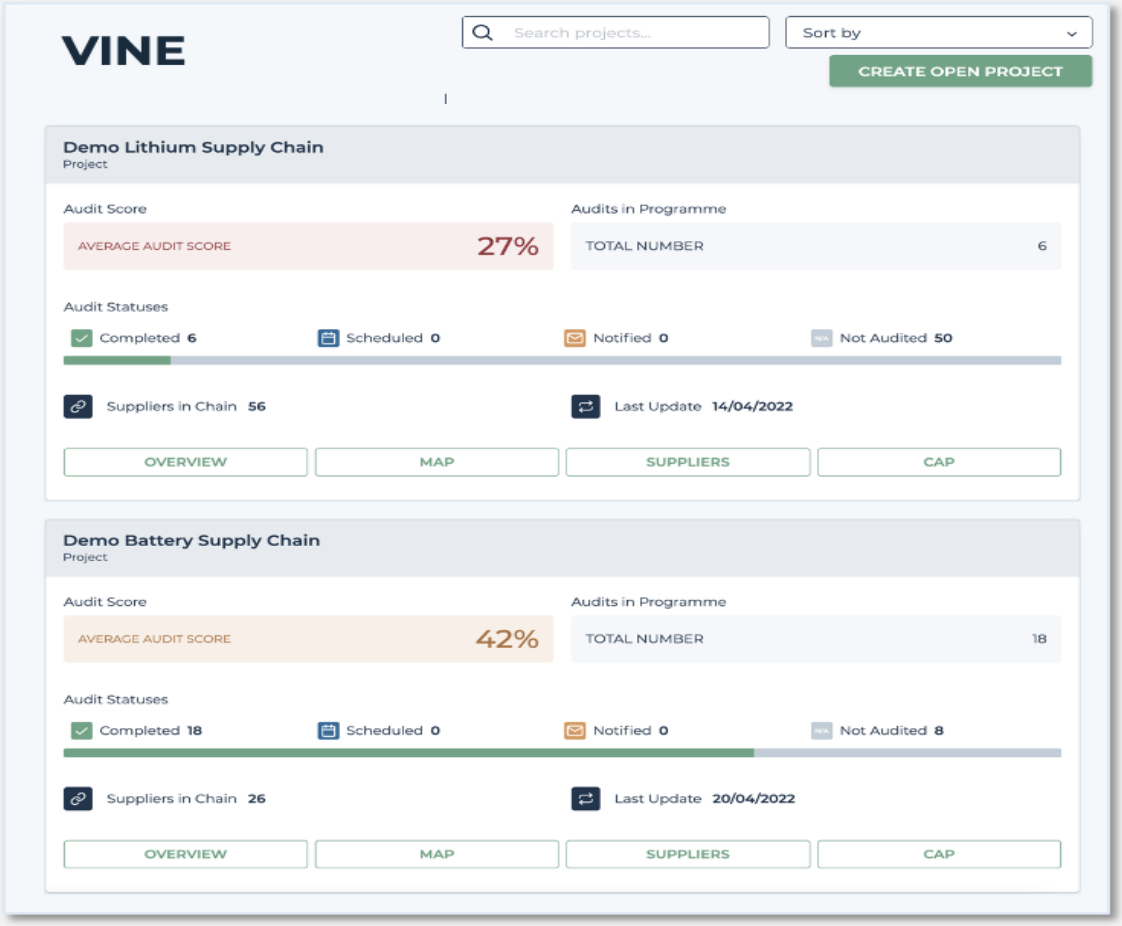
Maturity level and application sectors

VINE version 1.0 was launched in early 2022, current work is on version 1.5 as well as VINE Battery Passport extension. VINE is a platform used by various value-chain stakeholders' functioning in the mining, manufacturing, and automotive sectors. It offers clients a wide range of services including multi-tier supply chain visualisation, ESG & Due Diligence performance management, and audit programme overview.

The idea of Vine is to be a central element of multi-tool platform for multiple ESG and sustainability due diligence and risk management tools tailored towards particular business use cases (so the platform could work in connection with RCS Battery Passport & RCS Trace and other, depending on the business goals and case of the customer).




Overview
Map
Suppliers
CAP
Search suppliers...
SUPPLIER FILTERS
Supplier Type
Country
Material
Supplier Status
Training Received?
AUDIT FILTERS
Audit Score
Audit Status
Type of Audit
Audit Material Type
Conformance Scores
Report uploaded?
ISO 14001
ISO 45001
CAP status
CAP File Uploaded?
Mapped only?
CLEAR ALL
SEARCH
Supplier Name
Status
Supplies to
Type
Audit Score
Country
Demo Battery Su...
Verified
Demo OEM 11
Battery Supplier
1%
Canada
Demo Battery Su...
Verified
Demo Refiner 41
Battery Supplier
37%
South Sudan
Demo Battery Su...
Verified
Demo OEM 11
Battery Supplier
1%
Indonesia
OEM SUPPLIER
BATTERY PRODUCER
CATHODE PRODUCER
REFINER
TREATMENT UNIT
INDUSTRIAL MINE
ASM MINE
DEMO BATTERY SUPPLY CHAIN PROJECT
Overview
Map
Suppliers
CAP
Overview
Audit Status
CAP Status
Supplier Types
Material Groups



Useful link:

https://www.rcsglobal.com/vine-platform/

whatt.io

Product Life Cycle and Digital Spare Parts platform (whatt.io)
whatt.io is a cloud-based platform that allows businesses and consumers to access information, authenticate products, and order spare parts. Through a combination of NFC technology and QR codes, whatt.io enables users to simply tap their smartphones on products for instant access to relevant data, eliminating the need for apps. The accompanying app is used for fabrication and creating the token-based link to the physical product's metadata. The cloud-based administration of whatt.io is comprehensive, allowing for the management of complete product assemblies, sub-products, components, and a spare part library. The platform also features the 3MF Vault, a secure token and blockchain-based repository for protecting digital assets, such as production CAD models. whatt.io offers unique features that enhance authentication and safeguard digital IP and copyrights. By leveraging tokens and distributed data, the platform ensures secure access and protects intellectual property. The system is designed for seamless integration with other systems through API, enabling data sharing and retrieval.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized		Proprietary	Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		

T architecture: Data use	Labelling	Enforcement	Others	
IT architecture: Data mgmt features	**Evidence**	Blockchain	Verifiable Credentials	Others
	Convenience	Wallet	Data Ports	Others
	Data protection	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)	Others	

Unique technical aspects

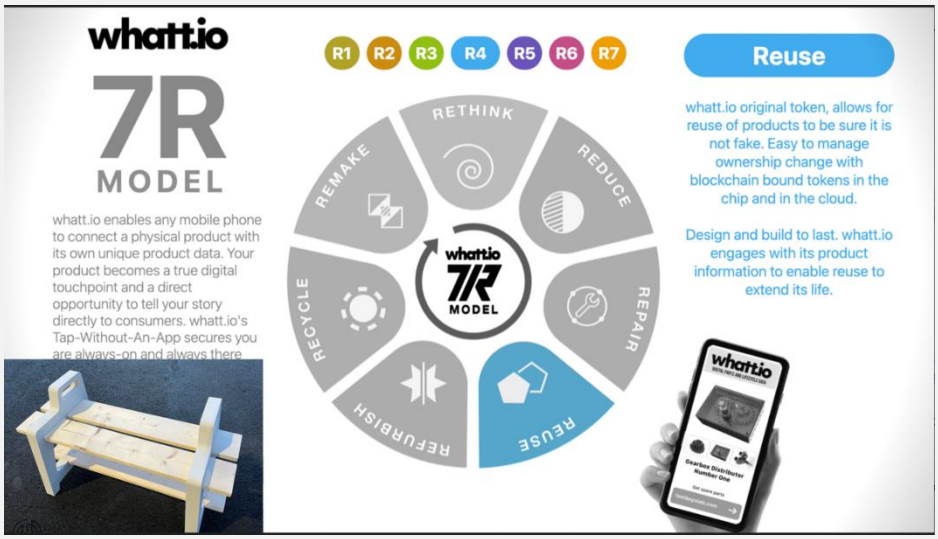
1. Cloud-based multi team and multiuser platform using only a web browser
2. Simple user access to product information by tapping the products NFC tag without using any APP installed.
3. Processes include embedding the NFC's inside the material.
4. App used for fabrication and creating token-based links to physical product metadata.
5. Comprehensive cloud-based administration for managing product assemblies, sub-products, components, and spare parts library
6. 3MF Vault for secure storage of digital assets
7. Unique features enhancing authentication and protecting digital IP and copyrights
8. API integration for seamless data sharing and retrieval
9. Digital spare parts that allow for immediate order of parts in decentralized e-commerce applications or direct download of 3D asset for local manufacturing (Additive Manufacturing)
10. Support for circular models, 7Rs
11. No prototype, technology in use and open as freemium

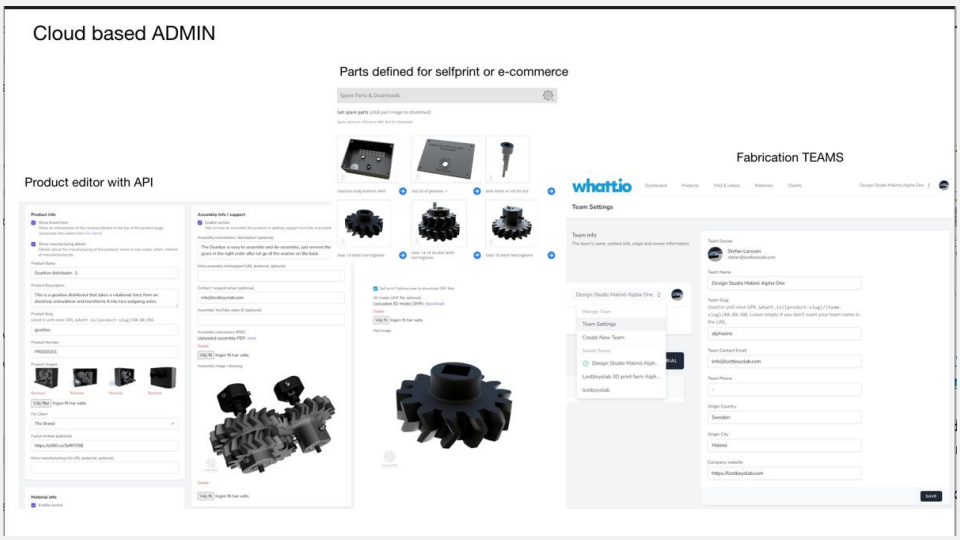
Maturity level and application sectors

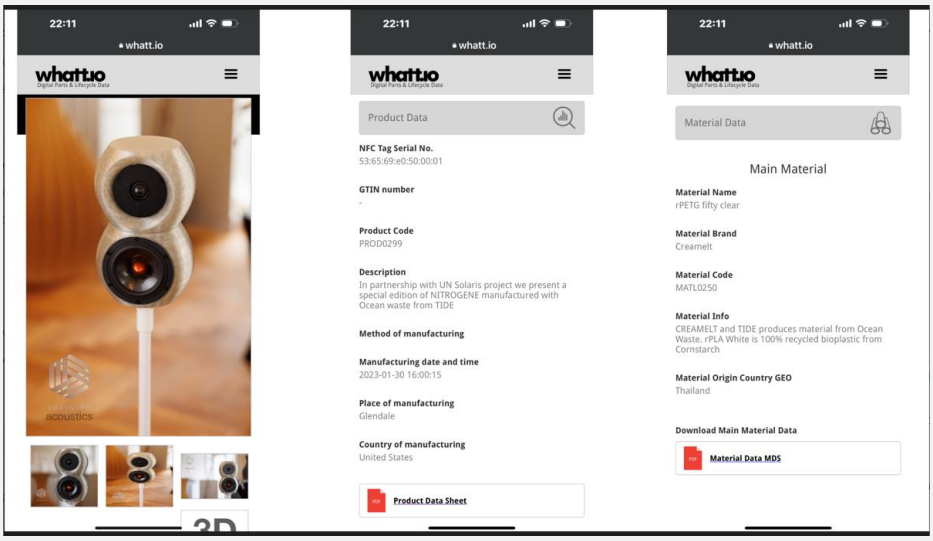
whatt.io is a mature and fully functional cloud-based platform. All apps for both Apple iOS and Google Android are available to be downloaded and used. The system is used in multiple industries like industrial, construction, additive manufacturing, furniture, accessories, electronics and building components.

The main functionality of whatt.io is sustainable products made from recycled materials and 3D printing plays a major role. As the solution handles very complex and multi-level substructure of products it is likely to attract products and brands that have multiple levels of spare parts and allow for refurbishment, remake, repair and recycle. Eprel, and MSD, MSDS, SVHC, RoHS, EPD certificates are standardised data sets in the system. The focus of development has been to build a system that can protect original products and also protect IP and copyright on the digital assets used for repairs for example.


THE WHAT whattio
TURN YOUR PRODUCT INTO A PLATFORM
TAP INTO DIGITAL PARTS AND LIFECYCLE DATA
POWERFUL PASSIVE IOT
• TRACEABLE
• UNIQUE COMPONENT
• CARRY ITS OWN INFO
• PASSIVE IOT
• CONSUMER TOUCHPOINT
SMART PRODUCTS
INSTANT ACCESS
• 1.6 BN INSTANT DEVICES
• TAP WITHOUT AN APP
• ON DEMAND INFO
• ALWAYS ON, ALWAYS UP-TO-DATE
NO APP JUST TAP
BRAND VALUE
ENGAGE CUSTOMERS THROUGHOUT ENTIRE PRODUCT LIFECYCLE
USER VALUE
SINGLE SOURCE OF TRUTH, DIRECT ACCESS TO COMPLETE INFO
PRODUCT DATA
PRODUCT DATABASE
• MATERIAL DB
• PRODUCT DB
• BRAND DB
• TEAM
• PARTS LIST
• FABRICATION ID:S
EASY CLOUD BASED ADMIN
INSTANT INFO, ALWAYS ON
• DIGITAL SPAREPARTS
• MATERIAL INFO
• RECYCLING INFO
• RETURN INFO
• PRODUCT ASSEMBLY
MULTITUDE OF BENEFITS
GLOBAL VALUE
CIRCULAR USE OF RESOURCES REDUCE AND CONSERVE MATERIALS
Gearbox Distributor Number One
Copyright, all rights reserved whatt.io™


whatt.io
7R MODEL
whatt.io enables any mobile phone to connect a physical product with its own unique product data. Your product becomes a true digital touchpoint and a direct opportunity to tell your story directly to consumers. whatt.io's Tap-Without-An-App secures you are always-on and always there.
R1 R2 R3 R4 R5 R6 R7
RETHINK
REDUCE
REPAIR
REUSE
REFURBISH
RECYCLE
REMAKE
whattio 7R MODEL
Reuse
whatt.io original token, allows for reuse of products to be sure it is not fake. Easy to manage ownership change with blockchain bound tokens in the chip and in the cloud.
Design and build to last. whatt.io engages with its product information to enable reuse to extend its life.


Cloud based ADMIN
Parts defined for selfprint or e-commerce
Product editor with API
Fabrication TEAMS
whattio



Useful links:

Seminar about circular economy whatt.io. https://youtu.be/xyH-quNg2_Y
Parts and assemblies: https://youtu.be/mEy0LqQB1aU
Getting started: https://youtu.be/sJTFUanPa_g

World of Pi

World of Pi
World of Pi addresses the problem of wasteful consumption by promoting a circular economy. We focus on extending product lifespan and encouraging manufacturers to produce durable goods. Our aim is to simplify product management for consumers and reward sustainable choices. Through our Circularity Assistant app 'Pi,' connected to products via QR codes or chips, we facilitate maintenance, sharing, repair, and recycling. Pi also includes a Digital Product Passport for transparency and responsible decision-making. This aligns with EU efforts to reduce environmental impact, making Pi a practical solution for sustainability challenges.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order	Single item	
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports	Others	
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

World of Pi distinguishes itself technically by leveraging a blockchain-based solution in partnership with Smart Media Technologies, integrating the Digital Product Passport (DPP) within our Circularity Assistant 'Pi'. This app, connecting to products via QR codes or chips, supports sustainable, circular lifecycle management. Blockchain technology ensures the integrity, security, and transparency of product information, facilitating trust in the digital history of items. Through Pi, consumers and manufacturers engage in services like maintenance, repair, and recycling, with DPP providing detailed data on origin, composition, and environmental impact. This setup not only aligns with EU sustainability goals but also represents a pioneering approach in tech-driven environmental stewardship.

Maturity level and application sectors

World of Pi, rooted in and focusing on the design industry, serves this sector with a dedication that reads "from the design industry, for the design industry." Our maturity level is demonstrated by our initial collaboration with Ruckstuhl, which has been successfully running for over a year. We've expanded our ecosystem by incorporating partners like Zumtobel, Williams Streetwear, and Flinc, among others. These collaborations across various sub-sectors within the design industry—from high-end furniture to lighting solutions and streetwear—highlight our application's versatility and adaptability. Our technology's application sectors are broad, reflecting our capability to meet diverse needs within the design world, paving the way for a more sustainable industry standard through blockchain-based solutions and the Digital Product Passport.

Useful link:

www.world-of-pi.com

Ziri Dynamics

Ziri Dynamics
Rooted in sustainability, ZIRI Dynamics aims to transform conventional garment labels into dynamic platforms, enhancing transparency, authenticity, and consumer engagement. Utilizing blockchain technology, we secure product authenticity, fostering trust in the industry. Our comprehensive solution ensures compliance with upcoming European DPP regulations and integrates AI for advanced consumer engagement. With a focus on the circular economy, ZIRI Dynamics is setting new standards for transparency in the textile industry, redefining consumer-brand interactions, connecting textile products to customers, and providing additional goods and services. Ziri Dynamics is a suite of components that, together, create a platform enabling consumers to interact, understand product composition, and enjoy unique personal experiences. This framework supports the circular economy, extending the product's life cycle beyond the initial purchase point.

Mapping with respect to the reference framework							
Product ID	**Type**	Instance		Category			
	Granularity	Model	Batch	Prod. order	Single item		
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes		No			
	Resolver	Yes		No			
Digital connector	**ID minting**	Centralized		Decentralized			
	Data storage location	Centralized		Decentralized			
IT architecture: Data transport	**Openness level**	Standardized	Proprietary	Data ports	Others		
	Data packaging	Data transfer		API			
IT architecture: Access control	**Level**	Simple		Advanced			
	If advanced	Attribute based		Role based			
IT architecture: Data use	Labelling	Enforcement		Others			
IT architecture:	**Evidence**	Blockchain	Verifiable Credentials	Others			
	Convenience	Wallet	Data Ports	Others			

Data mgmt features	**Data protection**	PETs	Anonymization	Others
	Traceability	Tagging (QR, NFC, RFID)		Others

Unique technical aspects

Ziri Dynamics suite of solutions include:

- physical elements that identify the product and provide the physical layer for the product's DPP, like physical tags using NFC technology, tags supporting bluetooth low energy technology, QR codes, and other identifying elements, all protected via encryption
- a web-based experience that enables consumers to get information about the product's sustainability and enables simple registration to access information, offers, and other consumer benefits
- a blockchain-based transactional engine that ensures the integrity of transactions and protection of data and interactions between consumers, the brand, and associated partners, integrated with the brand's production and data infrastructure
- a rich data web-based administrative experience that helps the brand sustainability officers to understand the impact of their products, using AI for marketing and brand managers to create unique consumer experiences
- we use Swiss secure servers for our data and are nFAD and GDPR compliant

Maturity level and application sectors

The Ziri Dynamics suite, catering to the fashion, lifestyle, and sports apparel sectors, offers innovative solutions for product authenticity and enriches the customer experience. Our suite seamlessly connects with the circular economy, facilitating activities like recycling, repairing, reselling, and donating. It's designed to integrate various stakeholders within these industries, including brands, resellers, recyclers, and consumers. Currently in the advanced stages of development, with a robust design and architecture already established, Ziri Dynamics is set to launch into production by mid-2024. This suite represents a significant leap in sustainable practices for the textile industry, embodying our commitment to innovation and environmental responsibility.

ZIRI DYNAMICS

Useful link:

https://www.ziridynamics.com/

ZVEI DPP4.0

DPP 4.0

The Digital Product Passport 4.0 (DPP4.0) is an industry-ready way of collecting and providing product information in a human- and machine-readable format for different parties, such as companies, authorities, and users. The DPP4.0 can include all product information of the complete product lifecycle, which enables different use-cases. Furthermore, by having the product documentation that today must be provided in paper in a digital format, paper waste can be reduced across the industry and sustainability can be increased.

Mapping with respect to the reference framework

Product ID	**Type**	Instance			Category		
	Granularity	Model	Batch		Prod. order		Single item
Product data carrier	**Type**	RFID	QR Code	Digital watermark	Bluetooth label	Bar Code	Other
	Machine readable data carrier	Yes			No		
	Resolver	Yes			No		
Digital connector	**ID minting**	Centralized			Decentralized		
	Data storage location	Centralized			Decentralized		
IT architecture: Data transport	**Openness level**	Standardized	Proprietary		Data ports		Others
	Data packaging	Data transfer			API		
IT architecture: Access control	**Level**	Simple			Advanced		
	If advanced	Attribute based			Role based		
IT architecture: Data use	Labelling	Enforcement			Others		
IT architecture: Data mgmt features	**Evidence**	Blockchain		Verifiable Credentials		Others	
	Convenience	Wallet		Data Ports		Others	
	Data protection	PETs		Anonymization		Others	
	Traceability	Tagging (QR, NFC, RFID)			Others		

Unique technical aspects

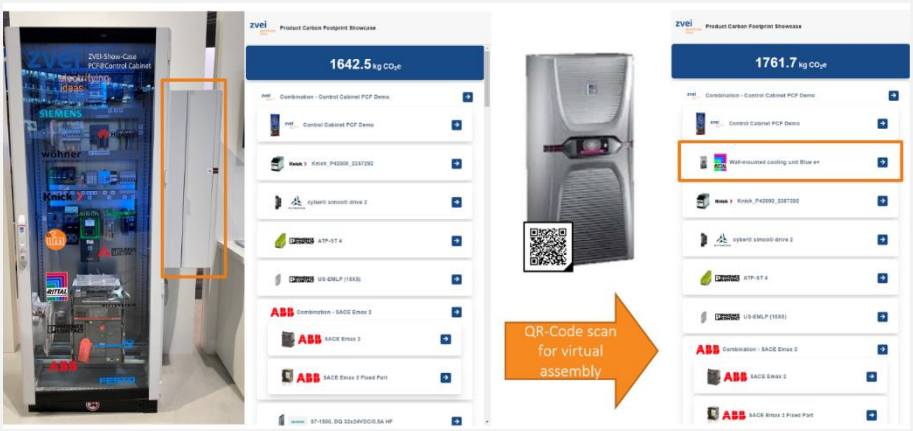
The DPP4.0 combines the unique identification of product instances, product types, batches or lots via identification link (IEC 61406) and information transfer with the Asset Administration Shell (AAS, IEC 63278) that offers a semantically unambiguous description of product information in a machine-readable format in accordance with ECLASS and/or IEC CDD. Via the ID-Link, the information can be accessed and used in different processes across companies, authorities, and users. In the AAS product information is organized in sub-models which are a collection of properties that can be standardised. Additional submodels can be added based on use-cases. Access to the information can be controlled via attribute-based access control. The AAS can be stored/hosted decentrally, e.g., on the infrastructure of the companies as well as on infrastructure offered by third parties and data-providers. The identification link and the AAS are IEC standards to ensure that the DPP4.0 is accessible and usable for all companies and products.

Maturity level and application sectors

The identification link connects a physical asset with its digital representation in form of the AAS. The AAS is an IEC standard in development and used by many companies in the industrial sector. For the AAS especially, a user organisation in form of the IDTA (Industrial Digital Twin Association) was found in 2021 with 23 members which increased to more than 70 members today. Associated companies are mainly in the electric and digital industry, the battery sector as well as manufacturing. On the SPS Nuremberg 2022, 27 companies presented use-cases that included the AAS. The ZVEI manages the project “ZVEI-Show-Case PCF@Control Cabinet” to demonstrate the DPP4.0 with the example of a control cabinet. Around 30 companies are associated with this project of which many were able to provide the needed AAS and ID-Link for the DPP4.0. Note that the DPP4.0 is not limited to these sectors as the underlying technology can be used in different sectors as well.

The ZVEI-Show-Case on the Digital Summit 2022:

How the DPP4.0 can be used in company processes across the supply chain using the example of product carbon footprint (PCF) calculations:



Left shows the control cabinet and its digital twin without the climate control unit (orange box). The blue box of the digital twin shows the current PCF value. When the climate control unit is added in the assembly process, the ID-Link can be scanned to retrieve the product information for the climate control unit. This information can than automatically be used to update the digital twin of the now completely assembled control cabinet, including its PCF value.

Useful links:

ZVEI-Show-Case: ZVEI-Show-Case PCF@ControlCabinet - zvei.org
IDTA Members and Partners: Members & Partners - IDTA English (industrialdigitaltwin.org)