

# **UN Transparency Protocol**



# Table of contents:

- About the UNTP
  - Presentations & Videos
  - Incentives for sustainable supply chains are increasing
  - But endemic greenwashing risks devaluing the incentives
  - Challenges
  - The United Nations Transparency Protocol (UNTP)
- Audience, Benefits & Goals
- Goals
- Target Audience & Benefits
  - Regulators
  - ESG Standards Organisations
  - Accreditation & Certification Organisations
  - Primary Producers & Manufacturers
  - Brands & Retailers
  - Recyclers & Refurbishers
  - Environmental & Human Welfare Organisations
  - Consumers
  - Transport & Logistics Providers
  - Financial Institutions
  - Industry Member Associations
  - Software Developers
  - Service Providers
- Success Measures
- Requirements
  - UNTP Business Requirements
    - Governance Requirements
    - Architectural Requirements
    - Traceability & Transparency Requirements
    - Trust & Integrity Requirements
    - Security & Confidentiality Requirements
    - Compatibility & Interoperability Requirements
    - Implementation Requirements
  - Governance
    - Management process
    - Releases
    - Contribution Process

- Pledge
- Sustainability Pledge
- Specification
  - Architecture
  - Digital Product Passport
  - Conformity Credential
  - Traceability Events
  - Identifiers
  - Vocabularies
  - Verifiable Credentials
  - Data Carriers
- Architecture
  - Overview
  - Principles
  - UNTP conceptual overview
    - The data
    - Finding the data
    - Securing the data
    - Understanding the data
    - Valuing the data
  - UNTP for one product
  - UNTP for a value chain
- Digital Product Passport
  - Versions
  - Overview
  - Conceptual Model
  - Requirements
  - Logical Model
  - Data Definitions
    - ProductPassport
    - Party
    - Facility
    - Product
    - Claim
    - Metric
    - TraceabilityEvent
    - Material
    - Evidence

- Dimension
- Classification
- Identifier
- Measure
- Characteristic
- Code Tables
  - conformityTopic
  - unitOfMeasure
  - eventTypeCode
  - countryCode
  - evidenceFormat
  - assuranceLevelCode
- Sample
- Schema
- Examples from pilot projects
- Conformity Credential
  - Versions
  - Overview
  - Conceptual Model
  - Requirements
  - Logical Model
  - Data Definitions
    - ConformityAttestation
    - ConformityAssessmentScheme
    - Facility
    - Product
    - ConformityAssessment
    - Metric
    - ConformityEvidence
    - BinaryFile
    - Authority
    - Standard
    - Regulation
    - Criteria
    - Party
    - Evidence
    - Classification
    - Identifier

- Measure
- Code Tables
  - assessorAssuranceCode
  - assessmentAssuranceCode
  - attestationType
  - status
  - sustainabilityTopic
  - mimeType
  - encryptionMethod
  - evidenceFormat
  - unitOfMeasure
- Sample
- Traceability Events
  - Versions
  - Overview
  - Conceptual Model
  - Requirements
  - Logical Model
  - Data Definitions
    - Event
    - Object Event
    - Aggregation Event
    - Transaction Event
    - Transformation Event
    - AssociationEvent
    - QuantityElement
    - TradeDocument
    - Item
    - Party
    - SensorElement
    - Sensor
    - SensorData
- Code Tables
  - actionCode
  - dispositionCode
  - bizStepCode
  - UOM
  - documentTypeCode

- Samples
  - Object Event
  - Transaction Event
- Aggregation Event
  - Transformation Event
  - Association Event
- Working Examples
- Identifiers
  - Overview
  - Discoverability
  - Global Uniqueness
  - Resolvability
- Vocabularies
  - Overview
  - UN ESG Topic Map
  - ESG Standards Criteria
- Verifiable Credentials
- Overview
- Business requirements for UNTP application of VCs
- VC basic profile
- DID methods
- Render Method
- Presentations
- Vocabularies
- Roadmap
- Data Carriers
  - Overview
  - Resolvers
  - Link Vocabulary
  - 1D Barcodes
  - 2d Matrix Codes
  - QR Codes
  - RFID Codes
- Best Practices
  - Trust Anchors
  - Trust Graphs
  - Confidentiality
  - Counterfeiting

- Mass Balance
- ESG Rules
- GS1 Binding
- Trust Anchors
  - Overview
  - VC Representation
  - Public Web Representation
  - Identity Credentials
  - Accreditation Credentials
- Trust Graphs
  - Overview
  - Trust Graphs
  - JSON-LD Representation
  - SCHACL Graph verification
- Confidentiality
- Overview
  - Discoverable Public Data
  - Public Data with GUID key
  - Encrypted Data with Shared Key
  - Encrypted Data with Requestable Key
  - Selective Redaction
  - Private Data
  - Usage Patterns
- Anti-Counterfeiting
  - Overview
  - Product Serial DID
  - Product Serial VC
  - Brand Trust Root
  - Public Verification
  - Private Acquittal
- Mass Balance
  - Overview
- ESG Rules
  - Overview
- Business Case
- Business Case
- For Industry
- For Industry

- For Certifiers
- For Certifiers
- For Industry Associations
- For Industry Associations
- For Regulators
- For Regulators
- For Software Vendors
- For Software Vendors
- Implementation Guidance
- Implementation Guidance
- For Industry
- For Industry
- For Certifiers
- For Certifiers
- For Industry Associations
- For Industry Associations
- For Regulators
- For Regulators
- For Software Vendors
- For Software Vendors
- Test Services
- 3 Tier Test Architecture
  - UNTP Testing (the blue sections in the diagram)
    - Tier 1: UNTP Test: Technology Interoperability Testing
    - Tier 2: UNTP Test: UNTP Schema Testing
    - Tier 3: UNTP Test: Trust Graph Testing
  - Extension Testing (grey boxes)
    - Tier 1: Extension Test: Nothing?
    - Tier 2: Extension Test: Extension Schema Testing
    - Tier 3: Extension Test: Choreography Testing (Trust Graph Validation)
- Support
- Implementation Support
- Reference Implementation
- Reference Implementation
- Extensions Register
- Extensions Register
- Extensions Methodology
- Overview

- Extension Points
  - Schema Extensions
  - Vocabulary Extensions
  - Identifier Extensions
  - Choreography Extensions
- Testing Extensions
- Extensions Register
- Extensions Register
- Implementations Register
- Implementation Conformity
- Implementations Register

# About the UNTP

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

The United Nations Transparency Protocol (UNTP) aims to support governments and industry with practical measures to counter greenwashing by implementing supply chain traceability and transparency at the scale needed to achieve meaningful impacts on global sustainability outcomes.

## Presentations & Videos

- Short UNTP Presentation [PDF PPT](#)
- Longer UNTP Presentation [PDF PPT](#)
- Video presentation (15 mins) [Youtube](#)

## Incentives for sustainable supply chains are increasing

Incentives for sustainable supply chains are increasing fast.

- Regulations such as the European [Regulation on Deforestation](#) (EUDR) and [Carbon Border Adjustment Mechanism](#) (CBAM) will present market access barriers or increased border tariffs for non-sustainable produce.
- These regulations impose [due diligence obligations](#) on entire supply chains, not just final products. Penalties for repeated non-compliance can be as high as 4% of global revenue.
- Financial institutions are rapidly moving to ensure that capital is preferentially focussed on ESG assets. [According to Bloomberg](#), within a few years, around \$50 Trillion or one third of all global assets under management will be ESG assets.
- Consumer sentiment is driving purchasing decisions to favour sustainable products. At the same time, consumers are increasingly mistrustful of unverifiable claims and look for third party certification based on trusted standards.

# But endemic greenwashing risks devaluing the incentives

Greenwashing is a term used to describe a false, misleading, or untrue action or set of claims made by an organization about the positive impact that a company, product or service has on the environment or on social welfare. Just as the incentives described above provide a strong motivation for genuine sustainability in products, so they also provide stronger motivations for greenwashing.

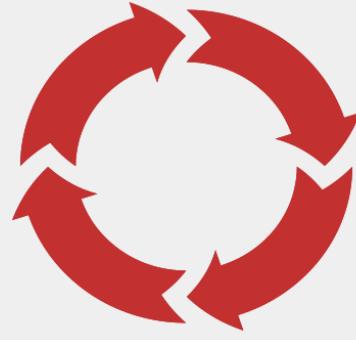
The evidence from multiple research activities is that greenwashing is already endemic with around 60% of claims being proven to be false or misleading. This presents a significant threat to sustainability outcomes. But there is room for optimism because around 70% of consumers expect higher integrity behaviour and are willing to pay for it. There are two plausible pathways ahead of us.

## A Race to the Top



1. It is hard to fake claims
2. Consumer confidence improves
3. Higher prices are justified
4. Business is motivated to make provable claims

## A Race to the Bottom



1. It is easy to fake claims
2. Consumer confidence drops
3. There's no price differential
4. Well-intentioned businesses fake claims to compete

To win the race to the top, fake claims need to be hard to make. The best way to achieve that is to make supply chains traceable and transparent so that unsustainable practices have nowhere to hide. But, to have any impact, the traceability and transparency measures must be implemented at scale.

## Challenges

The world's supply chains must reach to the point where digital verifiable traceability and transparency information are available to meet regulatory compliance, satisfy investors, and motivate consumers for

the majority of products on the market. However, achieving transparency at that scale presents some challenges.

- **Which software to choose?** There are many traceability & transparency solutions on the marketplace. Many expect all actors in a given value chain to subscribe to the same platform in order to collect the data for end-to-end traceability. However, just as expecting your customers and suppliers to create accounts at your bank so that you can pay them is not rational or practical (that's why inter-bank payment standards exist), so the adoption of all actors in value chains to one platform is also not feasible or scalable. The UNTP is a standard protocol, not a platform, and assumes that supply chain data remains with each natural owner. So the answer to "which software to choose?" is "pick any, so long as it conforms to the UNTP".
- **Coping with a growing mountain of ESG standards and regulations.** The current count of ESG standards and regulations around the world runs into the thousands. Some are specific to particular commodities, jurisdictions, or ESG criteria and some cover multiple dimensions. There is very significant overlap between them and very little formal mutual recognition. The consequence is that it becomes very challenging for supply chain actors that sell to multiple export markets to know which criteria matter and how to demonstrate compliance. There is a risk that too much of the available ESG incentive is spent on demonstrating compliance and too little is left for implementing more sustainable practices. The UNTP does not add to the complexity by defining more ESG standards. Rather it seeks to minimise cost of compliance by making it simpler to test on-site ESG processes and data against multiple ESG criteria. Essentially this is about implementing a sustainable practice once and then re-using it to satisfy multiple overlapping criteria.
- **Protecting confidential information.** "Sunlight is the best auditor" and so verifiable transparency is the best greenwashing counter-measure. However, increased supply chain transparency for ESG purposes also risks exposure of commercially sensitive information. A viable transparency protocol must allow supply chain actors to share ESG evidence whilst protecting sensitive information. Rather than dictate what must be shared and what should not, the UNTP includes a suite of confidentiality measures that allow every supply chain actor to choose their own balance between confidentiality and transparency. The basic principle is that actors should be empowered to share only what delivers value.
- **Making a business case for implementation.** Each supply chain actor (or their software provider) will need to make a viable business case for implementation of the UNTP. The transparency incentives discussed in this section represent the benefit side of the equation. To keep the cost side as low as practical, UNTP has a strong "keep it simple" focus and offers a suite of implementation tools to further reduce cost. Some sample business case templates are provided to help actors make their case for action.

# The United Nations Transparency Protocol (UNTP)

The UNTP provides a solution to the transparency challenges facing the world's supply chains. By implementing a simple protocol that can be supported by existing business systems, stakeholders will realise immediate benefits and will become visible contributors to the sustainability of global supply chains.



# Audience, Benefits & Goals

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Goals

The primary goal of UNTP is to make significant reductions in the incidence of greenwashing by giving unsustainable behaviour nowhere to hide. This will also uplift the value of legitimate ESG credentials from supply chain actors that have implemented sustainable practices. UNTP will have achieved its purpose when

Goals	Description
Most supply chain shipments are accompanied by verifiable ESG performance data.	In complex supply chains this means that at each supply chain step verifiable product and ESG information accompanies products via a Digital Product Passport.
Greenwashing is a niche activity that is easily detected and quickly penalised by markets and regulators.	Businesses that chose not to share verifiable information about their products are assumed to be doing the wrong things from an ESG perspective and therefore get lower prices for their products or lose access to markets.
Products with the best sustainability characteristics enjoy the greatest market access and price uplift.	Sharing data about your products becomes a competitive advantage and your business chooses to compete on the basis of high quality information.

## Target Audience & Benefits

All stakeholders in the global supply chain have a role to play and benefits to realise through implementation of the UNTP. As explained in the [Architecture Overview](#), the UNTP is a decentralised architecture where actors can be issuers, or subjects, or verifiers of digital credentials. In many cases, actors will be issuers of some credentials, subjects of others, and verifiers of others. Therefore, the

stakeholder roles and benefits described here are separated into the issuer, subject, and verifier roles as appropriate.

## Regulators

Regulators define rules, issue permissions, and manage compliance. By implementing UNTP, regulators will uplift the value of the permissions they issue and improve the efficiency and integrity of compliance operations.

- The primary role of regulators as **issuers** is as a [trust anchor](#). When identity credentials such as business registration certificates are issued as digital verifiable credentials according to UNTP then the subjects of those credentials (trading businesses) can add strong verifiable identity to their supply chain transactions. Verifiable identity can facilitate green-lane pre-clearance at import border and higher confidence lending from financial institutions. Similarly, when ESG permits and certificates that demonstrate compliance with domestic regulations are issued digitally, then traders can also attach that evidence to their transactions. In short, when regulators act as digital trust anchors, they will be uplifting their balance of trade by improving access to export markets and trade finance for their traders.
- As **verifiers** of increasingly transparent supply chain data, regulators can significantly uplift compliance activities. Rather than depend on unverifiable claims in regulatory reports that are occasionally audited at high cost, regulators can confidently automate compliance assessment on most trade transactions, leaving a much smaller volume of trade for manual compliance and enforcement activities.

Finally, as national authorities increasingly seek to uplift environmental performance through regulatory initiatives such as consumer centric product passports, we recommend that national regulators consider the UNTP as the basis for their national initiatives. By designing national initiatives as [UNTP extensions](#), regulators will not only be able to re-use a rich and tested body of work, but will also reduce compliance costs for their domestic industry because they will be better aligned with international supply chains.

## ESG Standards Organisations

Standards organisations include the national and international standards authorities as well as industry led organisations. There are a wide variety of governance arrangements in place that impact the legitimacy and value of the published standards. Unlike regulators, standards bodies do not manage compliance which can be self-assessed, or third party audited by test & certification bodies. There are

hundreds of standards organisations which collectively issue thousands of ESG standards, each with dozens of specific conformity criteria (i.e. the rules). Most of these are published as PDF documents. The key role for standards authorities under UNTP is to make their ESG rules machine readable so that they can be accurately referenced in conformity credentials.

- When ESG standards organisations publish their [ESG criteria as a machine readable vocabulary](#) then they are empowering their community of certifiers to issue digital conformity credentials that unambiguously reference the scope of the conformity claims so that the credentials can be digitally verified.
- Standards authorities will generally not be issuers, subjects, or verifiers of digital credentials unless they also act as accreditation authorities for third party certifiers that will make conformity assessments - in which case they will be issuers of accreditation credentials as described in the next paragraph.

## Accreditation & Certification Organisations

There is a very well established [global framework for conformity assessment](#) of entities, processes, and products that has been in place for over 50 years. It provides assurance that products sold on the marketplace meet applicable quality, safety or ESG standards. Under the framework, independent third parties (certifiers) assess products against recognised standards and issue conformity certificates. Furthermore, a global network of mutually recognised national accreditation authorities assess the certifiers to ensure that the conformity certificates are issued by suitably qualified organisations. For example, a manufacturer may claim that their product meets a particular environmental standard. You might ask "how do I know that claim is true?" and the answer would be "because a third party tested the product and issued a certificate". You might then ask "yes, but how do I know that the third party can be trusted?" and the answer would be "because they have been accredited by the national accreditation authority". Despite all this, it's still a relatively simple process to create realistic looking but fake paper certificates. UNTP provides a standard way to digitally verify this chain of trust that is much harder to fake. UNTP does not demand that every product claim is third-party assessed, nor that every third party certifier is formally accredited, but does make that chain of trust visible where it exists. UNTP also recognises that less formal but still valuable chains of trust can exist - for example a farmer's environmental land management claims might be verified by a community organisation that is endorsed by a well-known global environmental organisation.

- When national accreditation authorities or other well-known and trusted organisations **issue** their accreditations as UNTP standard digital credentials then they are creating a digital [trust anchor](#) that empowers verifiers of ESG conformity certificates to decide whether they can be trusted. The **subject** of the accreditation is the third party conformity assessment body. Implementation of

UNTP will amplify the value of the accreditation and the brand or 'trust mark' of the accreditation authority.

- When third party conformity assessment bodies (certifiers) **issue** their product ESG certificates as UNTP standard digital credentials then they are empowering verifiers of the ESG certificates to digitally confirm that the certificates are genuine, have not been tampered, and have not been revoked. Furthermore if the digital conformity certificate contains a link to the accreditation credential then the full [digital chain of trust](#) is established. Producers, manufacturers, brands & retailers that implement UNTP will also demand digital versions of the conformity credentials that they can attach to their products. Therefore, conformity assessment bodies that can provide UNTP standard digital credentials will be preferred over those that cannot.

## Primary Producers & Manufacturers

Most physical products are made of materials that either grow above the ground or are dug out from below the ground. Primary producers such as farmers and miners represent the starting point for most supply chains. Recyclers are a special case and are treated separately by UNTP because they are both the end and the (re)start of circular supply chains. Manufacturers take raw or recycled materials and produce intermediate components or final products. Primary producers and manufacturers collectively represent the upstream feedstock supply chain for the branded products sold to consumers.

- When producers and manufacturers implement UNTP by [issuing B2B digital product passports](#) (DPP) and [linking them](#) to every shipment of goods to their customers, then they are simplifying life for their customers by providing data at the right granularity for them to incorporate their inputs such as scope 3 CO<sub>2</sub> emissions into their own product environmental footprint.
- When producers and manufacturers **issue** UNTP [traceability events](#) linked to product passports then they are providing provenance evidence that can inform supply chain resilience and preferential treatment decisions by their customers and export market regulators.
- When producers and manufacturers link third party issued UNTP [conformity credentials](#) then they are adding trust to the ESG claims in their DPPs that will uplift the value or market access for their products.
- When producers and manufacturers **issue** the complete collection of passports, traceability events, and conformity credentials and link them to product shipments then they will significantly uplift value to their downstream customers by empowering them to easily and verifiably meet their own ESG due-diligence obligations.
- When producers and manufacturers link their issuer identity to a strong identity credential (such as a government business registration or trademark ownership credential) and implement the UNTP

anti counterfeiting mechanism then they will add strong anti-fraud measures to their products and preserve the value of their sustainability actions.

Producers and manufacturers are themselves **verifiers** of any UNTP credentials linked to their upstream supply chain. The **confidentiality measures** defined by UNTP allow supply chain actors to selectively redact upstream credentials before passing them on to their downstream customers so that ESG evidence can be passed on without revealing commercially sensitive information.

## Brands & Retailers

Brands and retailers consume products from their upstream producers and manufacturers and sell to the consumer. Whilst it is of course true that some brands are also manufacturers and that some retail is to business rather than consumers, the key distinction that UNTP makes is between B2B activities vs B2C activities. Sales to the consumer market is highly regulated in most economies and some are starting to develop regulations that also require product passports to support informed consumer choice and/or improved recycling processes. Brands and retailers must meet domestic regulations and face scrutiny from an increasingly greenwashing-aware consumer as well as from environmental activist organisations. The potential for reputational damage and high fines for non-compliance present brands and retailers with a strong motivation to ensure that sustainable practices are in place both for themselves and their entire supply chain.

- When brands and retailers can **verify** UNTP credentials linked to shipments from their upstream suppliers then they can confidently meet their due-diligence obligations and have the rich and verifiable information necessary to issue any consumer-centric product passports required under domestic regulations.
- UNTP should not conflict with local regulations. When international brands and retailers **issue** UNTP **product passports, conformity credentials** and **traceability events** across all markets then they are providing a consistent way for consumers to discover and verify ESG performance and are establishing a strong framework for compliance with any current or emerging domestic regulations.
- When brands and retailers request UNTP credentials from their upstream suppliers then they are avoiding the challenges associated with imposing specific traceability software solutions on their supply chain. Instead, they are simply requesting conformance with a common standard, irrespective of software platform.
- When brands and retailers that have already made significant investments in GS1 identifiers and standards implement the UNTP, they can follow the GS1 binding to build upon and re-use their

existing investments. It should also be noted that UNTP does not impose GS1 solutions on organisations that have not already invested in GS1 standards.

- When brands and retailers link their issuer identity to a strong identity credential (such as a government business registration or trademark ownership credential) and implement the UNTP [anti counterfeiting](#) mechanism then they will add strong anti-fraud measures to their products and preserve the value of their sustainability actions.

## Recyclers & Refurbishers

Recyclers & refurbishers play a critical role in the transition to a [circular economy](#). Recyclers process used products into raw materials for re-use in new production processes. Refurbishers take old products and restore them for re-use. The goal of both processes is to improve sustainability outcomes by re-using natural resources rather than producing new raw materials. As regulators start to impose minimum recycled content requirements and other circularity regulations, the current linear economic model (produce, use, dispose) will require significant change to provide sufficient recycled materials to meet regulatory goals and consumer expectations. The UNTP is designed to support circular economies by including verifiable information on recycled content of products. UNTP also incentivises manufacturers to design new products to optimise recyclability and provides access to product data to better inform recycling processes.

- When manufacturers optimise their product design for recyclability and provide access to that information via **issued** UNTP passports then they are uplifting the end-of-life value of their products. Recyclers can leverage this data (especially for high value products like EV batteries) to optimise the efficiency of their recycling processes.
- When recyclers **issue** UNTP passports with their recycled material shipments, they are empowering their customers (manufacturers) to make verifiable claims about the percentage of recycled content in their products. This reduces the due diligence burden and non-compliance risk for manufacturers that face mandated minimum recycled content thresholds.
- When consumers see recycled content claims on products then they can **verify** them with confidence.

## Environmental & Human Welfare Organisations

There are a large number of national and global not-for-profit organisations who's purpose is to promote environmental or human welfare causes. Some "trust marks", such as the WWF panda, have

very high global brand recognition. Although these organisations don't have the enforcement teeth of regulators, they can strongly influence product market success when their trust mark is added (or revoked).

- When influential ESG trust marks establish well-governed accreditation frameworks and **issue** (or revoke) UNTP accreditation credentials then they are able to participate in the digital trust ecosystem as [trust anchors](#), thereby multiplying the power of their brand to drive sustainable production practices.

## Consumers

Consumer sentiment around sustainable production is strong and growing with over 70% of consumers in some economies actively choosing sustainable goods where possible. At the same time cynicism around greenwashing is increasing which acts to devalue sustainability claims. As greenwashing countermeasures such as UNTP and national regulations become widely adopted, it is reasonable to expect that consumers will become familiar with product passports and ESG verification techniques.

- When consumers can confidently **verify** the sustainability performance of products simply by scanning barcodes, QR codes or RFID tags then they will be more likely to choose products with verifiable and trustworthy ESG qualities over those that make unverifiable claims. When this behaviour is ubiquitous then consumers will have played a pivotal role in combatting greenwashing and winning the [race to the top](#).
- When products are also equipped with the UNTP [anti-counterfeiting](#) measures then consumers can not only **verify** ESG performance but also confirm that the performance is associated with an authentic product and not a fake. Producers, manufacturers, brands, and retailers can be confident that their sustainability investments are not devalued by counterfeit products.

## Transport & Logistics Providers

The movement of cargo by sea, air, and land accounts for around [10% of global emissions](#) and, unless transport itself becomes more sustainable, will account for the largest fraction of global emissions by 2050. Transport (especially by road) is therefore a key part of the emissions intensity of a product on the market. In the same way that UNTP makes ESG credentials discoverable from product batch identifiers, so UNTP allows ESG credentials for transport services to be discoverable from consignment identifiers such as waybill numbers. But is it the buyer of goods or the seller of goods that is responsible to include transportation in the ESG footprint? The UNTP answer is that it follows the [INCOTERMS](#) - essentially whoever pays for the transport has the responsibility to include the transport

in their product footprint. This ensures there are no gaps or double counting and that incentives are appropriately aligned.

- When transport & logistics providers **issue** UNTP transport credentials and link them to consignment identifiers then they are providing their customers with quantifiable and verifiable transport related ESG metrics to include in their product footprint. As producers, manufacturers, brands, and retailers seek to drive improvements in sustainability performance they will be incentivised to choose low emissions transportation services. This will uplift the value of sustainable transport services per tonne-kilometre.

## Financial Institutions

Financial institutions are under increasing pressure from both regulators and the investment community to grant preferential terms for investment capital to sustainable businesses. The finance industry will increasingly verify sustainable performance via their customer annual reporting according to [IFRS sustainability standards](#). Just as financial transactions such as bills, invoices and payments aggregate up to corporate financial statements such as profit & loss and balance sheets, so corporate level annual sustainability metrics are constructed from operational data such as UNTP digital product passports. Furthermore, at consignment level, trade finance instruments such as documentary letters of credit normally require sufficient documentation for goods clearance to be presented prior to payment release. For cases where goods may be blocked at the border due to non-compliance with ESG regulations, then financial institutions will require ESG compliance evidence prior to releasing funds.

- When banks can use UNTP product passports and conformity credentials to digitally **verify** ESG compliance for shipments covered by letters of credit then they can more confidently release payment.
- When banks that are providing investment capital on sustainability grounds to businesses that have implemented UNTP then there is a clear line of sight from UNTP-based operational processes to IFRS-based corporate ESG performance, thereby reducing the financial risk associated with the investment.

## Industry Member Associations

There are over 100,000 industry associations world-wide. Most represent a specific industry sector within a specific jurisdiction. These member associations typically provide advocacy on behalf of the community and offer best practice advice. In many cases the associations define quality standards and

branding that distinguish their member's products in the marketplace (eg genuine manuka honey). These member associations are well positioned to assist their members in navigating the complexity of domestic and international ESG standards and in assisting them to implement the UNTP. When a particular association member engages in fraudulent practices then it can quickly damage the reputation of the entire industry. Therefore, member associations are strongly incentivised to ensure that their membership adheres to quality standards and to eject non-compliant members. This includes supporting the adoption of industry-wide sustainable practices and UNTP as the digital evidence of those practices.

- Industry member associations may add value to their membership by developing UNTP industry profiles that provide their members with targeted implementation guidance that meets the needs of their industry and jurisdiction.
- Industry member associations may develop training and implementation services, possibly in partnership with local service providers, thereby adding both a valuable service and also a revenue stream for the member association.
- Industry member associations may act as a trusted independent quota managers to counter [mass balance fraud](#) amongst their membership. The value of this service would be increased if the industry association is accredited by either a national accreditation authority or a global environmental or human welfare organisation.

## Software Developers

Software developers provide the tooling that is needed to implement UNTP because they hold the data that is needed to **issue** UNTP credentials and they will also consume the data from UNTP credentials that are discovered and **verified**. This category includes enterprise resource planning (ERP) systems, ESG management systems, and traceability platforms. By implementing UNTP, software developers are empowering their customers to participate in global transparent supply chains. For large organisations with heavily customised systems, UNTP implementation may be a customer specific project. For smaller organisations that subscribe to off-the-shelf packages, UNTP conformity is more likely to be simply a new feature in a release roadmap.

- ERP systems are the natural issuers of UNTP product passports and traceability events because they manage the finance and logistics operations around the manufacturing, sales, and shipment of products.
- ESG management systems are the source of the ESG data such as carbon intensity that will populate UNTP product passports as well as the conformity credentials referenced by the product passport.

- Traceability platforms are used to provide traceability maps of the upstream supply chain. Rather than gathering this data by direct enrolment of upstream actors, UNTP provides a means to gather the same data by following verifiable linked data trails.

The three system types described here may exist in separate software products or may be parts of a more integrated system. Some ERP systems also manage ESG data. Some ESG platforms include traceability functions. It is not unlikely that ERP systems, whether through native product features or acquisition or partnerships, will evolve to offer this integrated set of capabilities to their customers. UNTP defines a simple and implementable standard for software developers to empower their customers to connect into global transparent and sustainable supply chains.

## Service Providers

The adoption of UNTP by hundreds of millions of micro (under 5 employees) and small (under 50 employees) business will most likely be driven by implementation of UNTP as out-of-the-box capability by their chosen business software systems. However, the adoption of UNTP by tens of millions of medium (under 500 employees) and large (over 500 employees) business will most likely require some business analysis and systems integration investment. To minimise cost and risk, such businesses are likely to seek UNTP implementation support from a marketplace of experienced service providers.

- When service providers such as system integrators develop skills in UNTP implementation then they will be able to offer attractive service packages to their existing customers. They may also be able to leverage UNTP implementations skills to access new customers and markets.

## Success Measures

Although reduced greenwashing and improved sustainability are the ultimate goals of UNTP, the most direct measure of success is uptake. Therefore, UNTP will measure uptake by counting the number of pledges (i.e. promises to implement) and the number of successfully completed conformity tests (i.e. actual implementations). For UNTP to achieve its goals, uptake will need to exceed the minimum thresholds shown in the uptake trajectory below.

Stakeholder type	2024 pledge	2024 implement	2026 pledge	2026 implement	2028 pledge	2028 implement	2030 pledge
Regulators	10	1	20	10	50	20	200

Stakeholder type	2024 pledge	2024 implement	2026 pledge	2026 implement	2028 pledge	2028 implement	2030 pledge
ESG Standards	10	0	20	10	50	20	200
Accreditation & certification	20	2	50	25	100	50	300
Producers & manufacturers	50	10	500	100	2,000	1,000	10,000
Brands & retailers	50	10	500	100	2,000	1,000	10,000
Recyclers & refurbishers	10	0	20	10	50	20	200
Transport & logistics	20	2	50	25	100	50	300
Financial institutions	10	0	20	10	50	20	200
Member associations	20	10	200	100	1,000	500	3,000
Software developers	20	2	50	25	100	50	300
Service providers	20	2	50	25	100	50	300

Actual progress towards these targets will be tracked via the [Implementations](#) pages.

# Requirements

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## UNTP Business Requirements

This page provides a summary of the high level business requirements for UNTP, grouped into 7 categories. Each requirement is linked to the page(s) where the solution to the requirement is defined.

## Governance Requirements

This set of requirements aim to ensure that UNTP is governed in an open and transparent manner, is freely available to all, and is extensible to meet specific industry and jurisdictional needs.

ID	Name	Requirement Statement	Solution Mapping
GV.01	Consensus driven process	UNTP development MUST be managed via a transparent and consensus-driven process that is open to contributions from all stakeholders - so that implementers can have confidence that the UNTP will meet their requirements.	<a href="#">Governance</a>
GV.02	Freely available	The UNTP IP MUST be owned by the UN and be permanently free to access and free to use - so that implementers can have confidence that there will never be any fees for use or IP infringement claims.	<a href="#">Governance</a>
GV.03	Backwards compatible	New versions of UNTP SHOULD be backwards compatible with earlier versions and each version MUST remain active and supported for a	<a href="#">Governance</a>

ID	Name	Requirement Statement	Solution Mapping
		minimum of 2 years - so that implementers can have confidence in the durability of their investment.	
GV.04	Open source	UNTP implementation tools including reference implementations and test services MUST be available under open source and royalty free licensing - so that implementers can confidently use the tools to minimise their own implementation costs	Tools & Support
GV.05	Extensible	The UNTP MUST define a non-breaking extensions methodology - so that UNTP can be extended to meet specific jurisdictional or industry requirements and so that implementers of a registered extension can be confident that their implementation is interoperable with UNTP core.	Extensions
GV.06	Reusable extensions	Industry and/or jurisdictional extensions to the UNTP SHOULD also be governed via an open process and released under royalty free license terms - so that implementers of extensions can have same fees & IP confidence as with UNTP core.	Extensions
GV.07	Implementation pledge	UNTP MUST provide a mechanism for implementers to pledge their support and to register their implementations - so that implementers can choose to register both their sustainability commitment and conformant solutions for discovery by a global community of users and/or customers.	Implementations

# Architectural Requirements

This set of requirements aim to ensure that UNTP is scalable enough to achieve global implementations at a volume of global trade that is sufficient to have a material impact on greenwashing - by building on top of existing industry systems and practices and using the simplest possible framework that meets the goals.

ID	Name	Requirement Statement	Solution Mapping
AR.01	Protocol over platform	The UNTP MUST define a standard protocol that is easily implemented by any business software system - so that every supply chain actor can continue to use their preferred business software without any need for upstream or downstream actors to agree on the use of shared platforms.	Architecture
AR.02	Decentralisation	The UNTP MUST define a decentralised protocol where data is stored wherever the owner chooses - so that supply chain actors retain control of their data and are able to monetise their evidence of sustainable behaviour.	Architecture
AR.03	Natural business	The UNTP MUST accommodate the continued use of existing natural business, product, batch, and shipment identifiers - so that UNTP implementation imposes minimal disruption to existing business processes and can leverage existing business and product registers.	Identifiers
AR.04	Technical maturity	The UNTP MUST accommodate varying levels of technical maturity from (and including) paper based documents up to fully digitalised systems - so that every implementers of UNTP can confidently proceed without dependency on the capability or readiness of upstream or downstream actors.	Data Carriers

ID	Name	Requirement Statement	Solution Mapping
AR.05	Simplest possible core	The UNTP MUST prioritise simplicity by focussing on only the minimum specification that represents the common core needs across different jurisdictions and industries - so that implementation cost is minimised and interoperability is maximised.	Architecture
AR.06	Re-use not re-invent	The UNTP MUST re-use (rather than re-invent) existing standards (e.g. W3C Verifiable Credentials, GS1 EPCIS, UN vocabularies, etc) wherever they are fit for purpose - so that interoperability is maximised and existing investments in software components is re-used.	Architecture
TT.07	Rules as code	The UNTP MUST define a mechanism to simplify the compliance assessment of entities, products, and processes against the fast growing set of ESG standards and regulations - so that any actor's investment in sustainable practices is easily tested against multiple criteria.	ESG Rules

## Traceability & Transparency Requirements

This set of requirements aim to ensure that UNTP provides the traceability and transparency data needed for each supply chain actor to confidently meet their due diligence obligations and customer expectations for verifiable evidence of sustainable practices.

ID	Name	Requirement Statement	Solution Mapping
TT.01	Data carriers	The UNTP MUST define consistent methods for the discovery of data about products from both new and existing data carriers such as ID bar codes, 2D matrix, QR codes, and RFID tags - so that any party that has	Data Carriers

ID	Name	Requirement Statement	Solution Mapping
		only a product batch ID or goods shipment ID can find ESG data about that product or shipment.	
TT.02	item/batch granularity	The UNTP MUST provide data at the granularity of the individual items or batch in a shipment so that the downstream actor can easily aggregate their material inputs (e.g. scope 3 emissions) into their own ESG performance data.	Digital Product Passport
TT.03	end-to-end traceability	Subject to privacy & confidentiality constraints, the UNTP traceability model MUST be able to trace value chains from finished product to raw materials through any number of commercial boundaries (sale of goods), or logistics boundaries (consolidation & deconsolidation), and process boundaries (manufacturing transformation of inputs to different outputs) so that the provenance and ESG footprint of goods can be verified as the sum of component parts.	Traceability Events
TT.04	Sustainability data	The UNTP MUST provide a simple and consistent way to access and verify all available sustainability metrics (eg carbon intensity, deforestation, water usage, fair work, etc) about a given product item or batch - so that product buyers can easily meet their sustainability and due diligence obligations	Digital Product Passport, Conformity Credential
TT.05	Provenance data	The UNTP MUST provide verifiable provenance information (raw material content and manufacturing origin countries) about a given product item or batch - so that product buyers can easily meet their supply chain resilience and goods origin controls.	Digital Product Passport, Guarantee of Origin
TT.06	Circularity data	The UNTP MUST provide a simple mechanism to access circularity data including both recycled content metrics as well as end-of-life recycling information - so that	Digital Product Passport,

ID	Name	Requirement Statement	Solution Mapping
		product buyers can meet their recycled content goals and recyclers can optimise their recycling processes.	Circularity Data
TT.07	ESG Vocabulary	Given the volume and diversity of ESG standards and regulations, the UNTP MUST define a simple and scalable mechanism to define both the precise meaning and general category of ESG claims - so that downstream actors can map either the specific criteria or the general category of ESG data confidently.	Vocabulary

## Trust & Integrity Requirements

This set of requirements aim to ensure that UNTP provides data that can be trusted and is resilient to several greenwashing attack vectors.

ID	Name	Requirement Statement	Solution Mapping
TI.01	Trust anchors	Trust in truth of sustainability claims can be established by third party audits, or by attestation of trusted authorities, or by long standing evidence of sustainable behaviour. The UNTP MUST provide a mechanism to link ESG claims to any or all of these "trust anchors" so that downstream actors can have confidence that claimed ESG performance is true.	Trust Anchors
TI.02	Identity integrity	Identifiers of businesses, locations, products, and shipments underpin the UNTP. Therefore, the UNTP MUST provide a mechanism to verify that ESG claims made about products or locations or entities are made by actors that are genuine owners of the identifiers or their authorised delegates - so that downstream actors	Identifiers

ID	Name	Requirement Statement	Solution Mapping
		can be sure that ESG claims are made by parties genuinely authorised to do so.	
TI.03	Accreditation	Third party audits and assessments add trust. But if the verifier does not know the auditor / certifier then there's a risk that define a mechanism to link third party certifiers to the accreditation authority under which they perform their work so that downstream actors can trust the certificates even when they do not know the certifiers.	Conformity
TI.04	Verification of documents	The UNTP MUST define standard and interoperable mechanisms to prevent spoofing or tampering of any documents issued by upstream actors so that downstream actors can be confident that ESG credentials were genuinely issued by the claimed identity and have not been altered in any way.	Verifiable Credentials
TI.05	Verification of graphs	Evidence of ESG performance in supply chains is not concentrated in one document but rather is distributed along the entire value chain. The UNTP MUST define a mechanism to describe and verify the collection of evidence that is available from chains of linked documents so that downstream actors can verify the full ESG footprint and provenance data for any shipment.	Trust graphs
TI.06	Product substitution	As the brand value of verifiably sustainable products increases, so does the incentive to make fake products and attach them to genuinely verifiable sustainability evidence. The UNTP MUST define an anti-counterfeiting mechanism so that downstream actors can confirm that they have purchased genuine goods.	Anti-counterfeiting

ID	Name	Requirement Statement	Solution Mapping
TI.07	Mass balance fraud	Mass balance fraud occurs when a supply chain actor blends sustainable materials with cheaper non-sustainable materials as inputs to a manufacturing process and then claims that the manufactured product is 100% sustainable. The UNTP MUST define mechanisms to detect mass balance fraud so that downstream actors can be confident of the integrity of their sustainable supply chain and the value of sustainable products is maintained.	Mass balance

## Security & Confidentiality Requirements

This set of requirements aim to ensure that UNTP provides mechanisms to protect the security and confidentiality of supply chain data, allowing each actor to make their own choices about the balance between traceability & transparency.

ID	Name	Requirement Statement	Solution Mapping
SC.01	Transparency vs confidentiality	The UNTP MUST allow every supply chain actor to choose their own balance between transparency and confidentiality - so that each actor can choose to share only what delivers value whilst protecting the information they deem confidential.	Confidentiality
SC.02	Multi-layered security	Information about products have a range of commercial sensitivity from public data to highly confidential data. The UNTP MUST provide a range of data protection mechanisms that can be applied appropriately so that supply chain actors can choose the right protection level for specific data sets.	Confidentiality

ID	Name	Requirement Statement	Solution Mapping
SC.03	Selective redaction	<p>ESG data and credentials from sellers may contain data that buyers do not want to pass on to their own customers. The UNTP MUST define a selective redaction method that allows any supply chain actor to redact information (without affecting the cryptographic integrity) from credentials received from upstream suppliers before passing it on to their downstream customers - so that verifiable ESG data can be passed on without leaking commercially sensitive data.</p>	Confidentiality
SC.04	Revocation	<p>The UNTP MUST provide a mechanism to revoke previously issued conformity certificates when an actor is found to be non-compliant so that downstream actors can be confident of the currency of the ESG assessments they receive.</p>	Verifiable Credentials
SC.05	Availability	<p>UNTP MUST define a mechanism for high availability and long term durability of ESG evidence - so that data can be accessed by verifiers even when source systems are down, and so that data for long-lifetime products such as batteries or building materials can be accessed long after source systems are retired.</p>	Verifiable Credentials
SC.06	Cryptography	<p>The UNTP MUST support flexibility in cryptographic methods so that new algorithms can be supported as they emerge to meet new challenges such as quantum computing.</p>	Verifiable Credentials
SC.07	Key management	<p>The UNTP MUST provide mechanisms for the discovery of public keys, the protection of private keys, and the rotation of key pairs so that keys remain secure and can be easily chained if compromised.</p>	Verifiable Credentials

# Compatibility & Interoperability Requirements

This set of requirements aim to ensure that UNTP is compatible with existing standards for technology, ESG criteria, and supply chain practices so that implementers can maximise the leverage of existing investments.

ID	Name	Requirement Statement	Solution Mapping
CI.01	National regulations compatibility	UNTP conformant data SHOULD be straightforward to map to national ESG regulations so that it can usefully provide the upstream B2B ESG evidence to support national B2C product conformance.	Vocabulary, Extensions
CI.02	Entity ESG reporting compatibility	UNTP conformant ESG data about products & shipments MUST be straightforward to map to entity level ESG reporting obligations so that UNTP transaction level ESG data can be easily aggregated to inform annual ESG reporting that conforms to standards like IFRS sustainability.	Vocabulary
CI.03	ESG standards compatibility	The UNTP MUST be able to support ESG claims against criteria from any ESG standard and MUST provide a mechanism to map those claims to a common vocabulary - so that implementers can align with standards of their choice and verifiers can make sense of the claims even when they are unfamiliar with specific standard criteria	Vocabulary, ESG Rules
CI.04	Credential interoperability (VCs)	The UNTP MUST provide the flexibility to support multiple credential standards such as W3C Verifiable Credentials and Hyperledger Airies Anoncreds - so that ESG data along a value chain can be verified even when different credential standards are adopted by different actors along the value chain.	

ID	Name	Requirement Statement	Solution Mapping
CI.05	Blockchain	Whilst some implementers MAY choose blockchain technologies to underpin their solutions, the UNTP MUST NOT require the use of blockchain for conformant implementations - so that implementers that wish to avoid the costs and complexity of blockchain technologies are free to do so.	
CI.06	GS1 compatibility	GS1 identifiers and standards are ubiquitous at the downstream consumer goods end of most supply chains. The UNTP MUST be compatible with GS1 standards but MUST NOT require the use of GS1 standards - so that supply chain actors that are already invested in GS1 identifiers and standards can maintain and build upon that investment	
CI.07	Other registry compatibility	The UNTP MUST define a mechanism to support existing identity registers so that implementers can continue to leverage existing business identifiers such as tax registration numbers, cadastral lot numbers, shipping container numbers, and so on under UNTP	<a href="#">Identifiers</a> , <a href="#">Extensions</a>

## Implementation Requirements

This set of requirements aim to ensure that UNTP is implementable at the lowest possible cost, and that early implementers gain a marketing advantage, and that the impact of implementations can be tracked.

ID	Name	Requirement Statement	Solution Mapping
IM.01	Making a business case	Every UNTP implementer will need confidence that the benefits of their implementation	<a href="#">Business Case</a>

ID	Name	Requirement Statement	Solution Mapping
		outweighs the cost. UNTP SHOULD provide a set of business case templates so that each stakeholder type can fast-track their decision to proceed	
IM.02	Open source tools	The UNTP MUST include an open source reference implementation that any supply chain actor can embed into their solutions to help fast-track their implementation.	Tools
IM.03	Conformity testing	the UNTP MUST include a conformance test suite and test service so that each implementer can self-assess their conformance and be confident that their implementations will be interoperable.	Test service
IM.04	Implementation Support	UNTP MUST provide mechanisms for implementers to get either community support or professional support so that they can minimise their implementation risk.	Support
IM.05	Tracking implementations	UNTP MUST provide a mechanism to track implementations so that uptake and impact can be measured and so that early implementers can publicise their solutions.	Implementations
IM.06	Tracking extensions	UNTP MUST provide a mechanism to track and publish industry & jurisdictional extensions so that new extensions can find and re-use relevant work.	Extensions
IM.07	Greenwashing KPIs	Although uptake is a simple and concrete success measure, the real purpose of UNTP is to lift the value of sustainable practices by countering greenwashing. Therefore, UNTP	Greenwashing KPIs

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
		MUST develop a set of greenwashing KPIs that can be tracked to assess whether UNTP is having a material impact.	

# Governance

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Management process

The UNTP development follows the same **standard governance rules** as any UN/CEFACT project.

- Free to use,
- Open source licensed,
- Maintained via an open process
- Version controlled
- Lifecycle managed

## Releases

As per [docusaurus version management practices](#), the latest stable version of UNTP will always be shown by default at /docs (this site). In-progress future version will be hosted at /docs/next and previous versions at /versioned-docs/version-x.y. The version history includes major versions (breaking) and minor versions (non-breaking but with functional change) but not patch versions (bug fixes and typos) which overwrite the relevant minor version.

The UNTP includes a number of distinct and separately versioned components such as passport schema, traceability event schema and so on. To simplify implementation management, all separate component versions are grouped together and listed under each aggregated UNTP version.

UNTP Version	Status	Date	Components	Comment
0.0.0	Raw	2024-01-01	TBA	Empty framework

# Contribution Process

In general we follow the standard GIT Pull Request process.

1. By far the easiest way is to start from the Edit feature, here:

The screenshot shows a section of the United Nations Traceability Platform (UNTP) website. At the top, there's a navigation bar with the United Nations logo, a 'TP' icon, and links for 'About the UNTP', 'The specification', 'Tools and support', 'Extensions', 'Implementations', and social media icons for LinkedIn and GitHub.

The main content area has a sidebar on the left containing a list of topics: Architecture, Digital Product Passport, Conformity Credential, Traceability Events, Identifiers (which is highlighted with a blue background), Vocabularies, Verifiable Credentials, Data Carriers, Trust Anchors, Trust Graphs, Confidentiality, Anti-Counterfeiting, Mass Balance, and ESG Rules. Below this is a section for 'Business Case' with four items: Tools and support, Extensions Register, and Implementations Register.

The main content area displays three sections: 'Global Uniqueness', 'Resolvability', and 'Verifiability'. At the bottom of the content area, there are navigation buttons for 'Previous' (Traceability Events) and 'Next' (Vocabularies). A prominent red circle highlights the 'Edit this page' button, which is located between the 'Resolvability' and 'Verifiability' sections.

On the right side of the content area, there's a vertical sidebar with links: Overview, Discoverability, Global Uniqueness (which is also highlighted with a blue background), Resolvability, and Verifiability.

2. Make your changes in the markdown file, then commit:

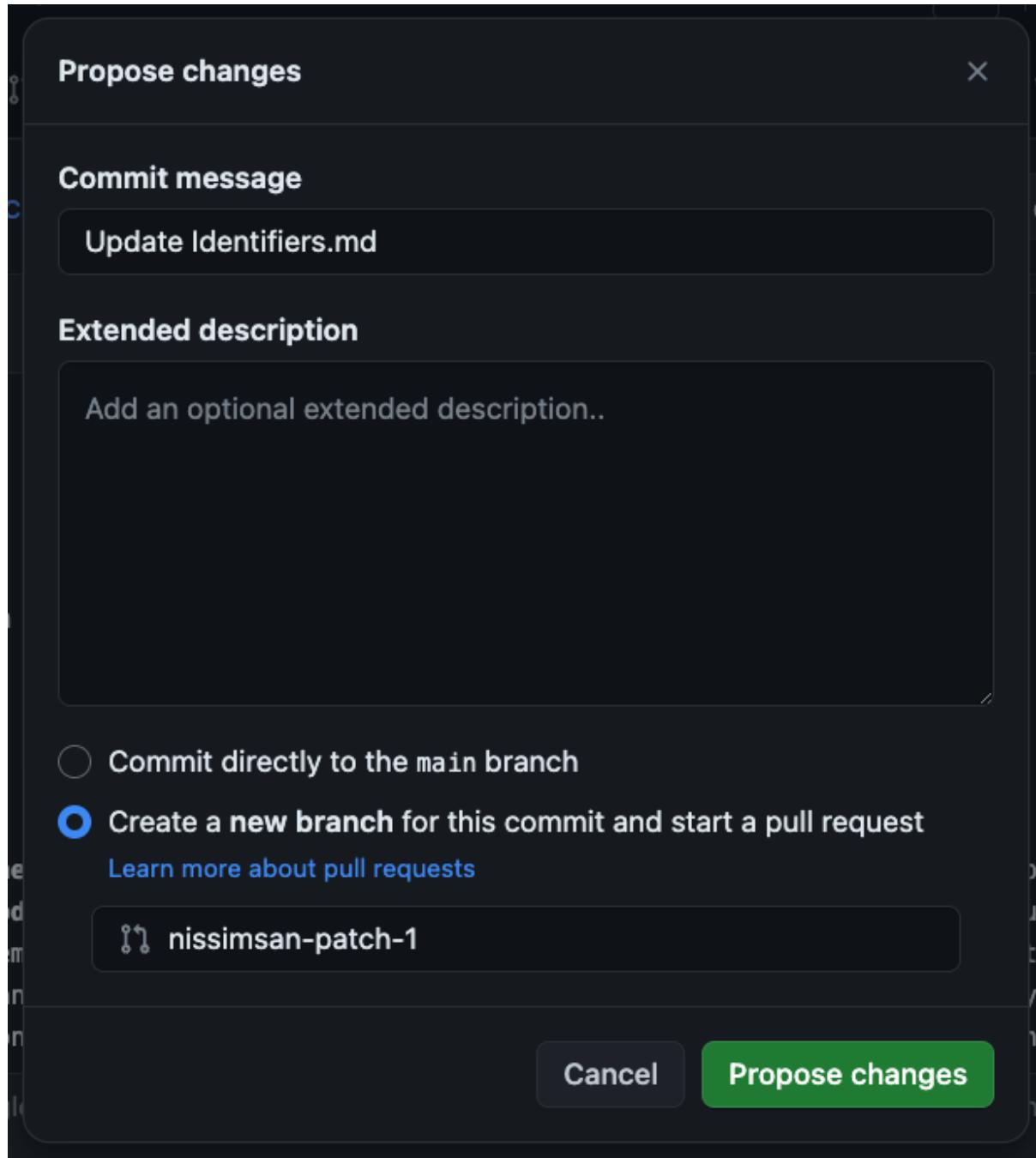
The screenshot shows a GitHub repository interface for the 'spec-untp' repository. The user is viewing the 'Identifiers.md' file in the 'main' branch. The file content is a markdown document with code-like syntax for styling. The 'Commit changes...' button in the top right corner is highlighted with a red oval.

```
1 ---  
2 sidebar_position: 20  
3 title: Identifiers  
4 ---  
5  
6 import Disclaimer from '../_\disclaimer.mdx';  
7  
8 <Disclaimer />  
9  
10 ## Overview  
11  
12 Identifiers of **businesses** (eg tax registration numbers), of **locations** (eg google pins or cadastral/lot numbers), and of **products** (eg GS1 GTINs or other schemes) are ubiquitous throughout supply chains and underpin the integrity of the system. UNTP builds upon existing identifier schemes without precluding the use of new schemes so that existing investments and high integrity registers can be leveraged. UNTP requires four key features of the identifiers and, for those that don't already embody these features, provides a framework to uplift the identifier scheme to meet
```

Control + Shift + m to toggle the tab key moving focus. Alternatively, use esc then tab to move to the next interactive element on the

Attach files by dragging & dropping, selecting or pasting them.

3. Just click okay on this (we don't have a commit message policy):



4. Then create a pull request for your change request. Here we do prefer a suitable title and a brief description of the change you are suggesting:

5. We will process your PR in the next meeting. Note that you will not see your change on the website before that happens, and we have agreed to merge your PR.



uncefact / spec-untp

Type to search

[Code](#)[Issues 30](#)[Pull requests 1](#)[Discussions](#)[Actions](#)[Projects](#)[Filters ▾](#) is:pr is:open[Labels 24](#)[Mi](#) 1 Open ✓ 18 Closed

Author ▾

Label ▾

Projects ▾

Milestones ▾

P

 Removing an out of place header

#63 opened now by nissimsan • Review required

# Pledge

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Sustainability Pledge

# Specification

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

The specification is the heart of UNTP. It defines the detailed specifications for interoperable implementations. This page provides an outline of the purpose and scope of each component of the specification.

## Architecture

The architecture is the blueprint for all the components of the specification and how they work together. It defines the **design principles** which underpin the UNTP and shows the components working together from the perspective of a **single actor** and across the **entire value-chain**. The UNTP is a fundamentally **decentralised architecture** with no central store of data.

## Digital Product Passport

The digital product passport (DPP) is issued by the shipper of goods and is the carrier of **product and sustainability information** for every serialised product item (or product batch) that is shipped between actors in the value chain. It is deliberately **simple and lightweight** and is designed to carry the minimum necessary data at the **granularity** needed by the receiver of goods - such as the scope 3 emissions in a product shipment. The passport contains links to **conformity credentials** which add trust to the ESG claims in the passport. The passport also contains links to **traceability events** which provide the "glue" to follow the linked-data trail (subject to confidentiality constraints) from finished product back to raw materials. The UNTP DPP does not conflict with national regulations such as the EU DPP. In fact, it can usefully be conceptualised as the **upstream B2B feedstock** that provides the data and evidence needed for the issuing of high quality national level product passports.

## Conformity Credential

Conformity credentials are usually issued by independent third parties and provide a **trusted assessment** of product ESG performance against credible **standards or regulations**. As such the credential provides trusted verification of the ESG claims in the passport. Since the passport may make several independent claims (eg emissions intensity, deforestation free, fair work, etc) there may be many linked conformity credentials referenced by one passport. As an additional trust layer, the conformity credential may reference an **accreditation** credential that attests to the authority of the third party to perform the specific ESG assessments. The conformity credential data model has been developed by a separate UN/CEFACT project on digital conformity that has expert membership from accreditation authorities and conformity assessment bodies.

## Traceability Events

Traceability events are very lightweights collections of identifiers that specify the “what, when, where, why and how” of the products and facilities that constitute a value chain. The UNTP is based on the [GS1 EPCIS](#) standard for this purpose because it is an existing and proven mechanism for supply chain traceability. Note that UNTP supports but does not require the use of GS1 identifiers. The basic idea behind the traceability event structure is that any supply chain of any complexity can always be accurately modelled using a combination of four basic event types. An **object** event describes an action on specific product(s) such as an inspection. A **transaction** event describes the exchange of product(s) between two actors such as sale of goods between seller and buyer. An **aggregation** event describes that consolidation or de-consolidation of products such as stacking bales of cotton on a pallet for transportation. Finally, a **transformation** event describes a manufacturing process that consumes input product(s) to create new output product(s). The UNTP uses these events in a decentralised architecture as the means to traverse the linked-data “graph” that represents the entire value-chain.

## Identifiers

Identifiers of **businesses** (eg tax registration numbers), of **locations** (eg google pins, cadastral/lot numbers, GS1 [GLNs](#)), and of **products** (eg GS1 [GTINs](#) or other schemes) are ubiquitous throughout supply chains and underpin the integrity of the system. UNTP builds upon existing identifier schemes without precluding the use of new schemes so that existing investments and high integrity registers can be leveraged. UNTP requires four key features of the identifiers and, for those that don't already embody these features, provides a framework to uplift the identifier scheme to meet UNTP requirements. Identifiers used in UNTP implementations should be **discoverable** (ie easily read by scanning a barcode, QR code, or RFID), **globally unique** (ie by adding a domain prefix to local schemes), **resolvable** (ie given an identifier, there is a standard way to find more data about the

identified thing), and **verifiable** (ie ownership of the identifier can be verified so that actors cannot make claims about identifiers they don't own).

## Vocabularies

Web **vocabularies** are a means to bring consistent understanding of **meaning** to ESG claims and assessments throughout transparent value chains based on UNTP. There are hundreds of ESG standards and regulations around the world, each with dozens or hundreds of specific conformity **criteria**. Any given value chain from raw materials to finished product is likely to include dozens of passports and conformity credentials issued against any of thousands of ESG criteria. Without a consistent means to make sense of this data, UNTP would provide a means to discover a lot of data but no easy way to make sense of it. The UNTP defines a standard and extensible topic map (taxonomy) of ESG criteria and provides a mechanism for any standards authority, or national regulator, or industry association to map their specific terminology to the UNTP vocabulary.

## Verifiable Credentials

The World-Wide-Web Consortium (W3C) has defined a standard called [Verifiable Credentials \(VCs\)](#). A VC is a portable digital version of everyday credentials like education certificates, permits, licenses, registrations, and so on. VCs are digitally signed by the issuing party and are tamper proof, privacy preserving, revokable, and digitally verifiable. The UN has previously assessed this standard and has recommended its use for a variety of cross border trade use cases in a recent [white paper](#). VCs are inherently decentralised and so are an excellent fit for UNTP which recommends that passports, credentials, and traceability events are all issued as W3C VCs. A related W3C standard called [Decentralised Identifiers \(DIDs\)](#) provides a mechanism to manage the cryptographic keys used by verifiable credentials and also to link multiple credentials into verifiable trust graphs. DIDs are not the same as the business / product / location identifiers maintained by authoritative agencies - but can be linked to them.

## Data Carriers

Digital data needs to be linked to the physical product it describes and should be discoverable through the identifiers printed on that product serial or batch number. For high volume goods and easy / reliable discovery, these identifiers are already typically represented as barcodes, matrix codes, QR codes, or RFID encoded data. UNTP supports the use of these existing data carriers. A basic UNTP principle is that if you have a product then you should be able to find ESG data about that product

even when the identifier is not a web link. Therefore, the UNTP defines a generalised protocol (based on [GS1 Digital Link](#)) to allow any identifier scheme (GS1 or otherwise) to be consistently resolvable so that product passports and other data can always be accessed from the identifier of the product. The UNTP also defines a specific QR based data carrier format for use on paper/PDF versions of conformity credentials or other trade documents that provides secure access to credentials in a way that is both human and machine readable. This provides a simple but powerful mechanism to facilitate uptake of digital solutions alongside existing paper/PDF based frameworks.

# Architecture

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

The architecture is the blueprint for all the components of the specification and how they work together. It defines the **design principles** which underpin the UNTP and shows the components working together from the perspective of a **single actor** and across the **entire value-chain**. The UNTP is a fundamentally **decentralised architecture** with no central store of data.

## Principles

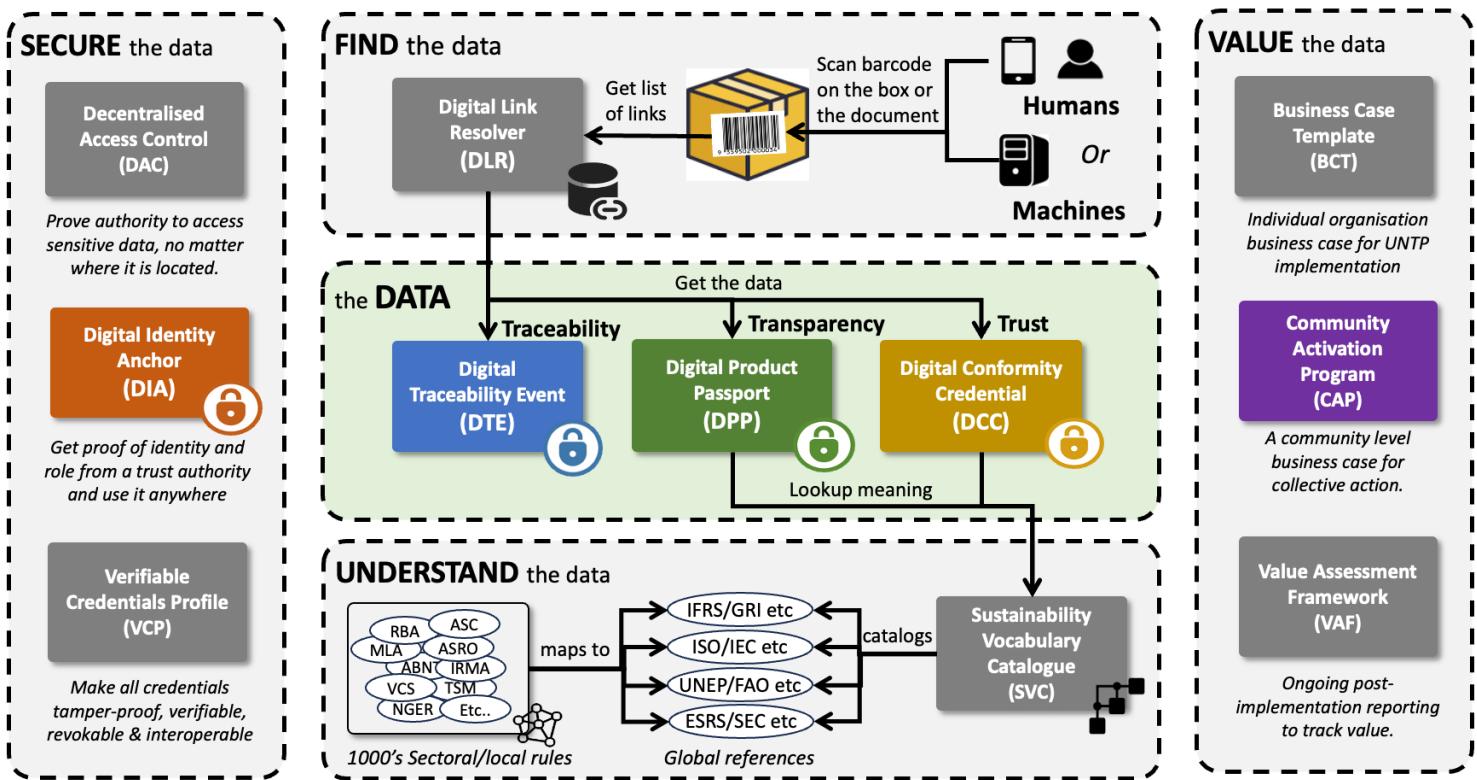
The architecture principles that guide the UNTP design are

Name	Principle	Rationale
No dependency	UNTP should not require any collaboration or dependency between the issuer of DPPs and the consumer / verifier	Imposing such collaboration as a pre-requisite for action in a complex many-to-many ecosystem would essentially stall progress
Unknown verifier	UNTP should not assume that the consumer / verifier of UNTP data is known to the issuer, even when confidential data access is required	In a decentralised architecture with thousands of issuers, it would be impractical to register every authorised verifier with every issuer.
Any maturity	UNTP should not assume any technical maturity for verifiers	DPPs and other credentials must work equally for human and machine verifiers - otherwise an insurmountable complexity of

Name	Principle	Rationale
		knowing which customer has what capability would be required
Legacy data carriers	UNTP should work with any carrier of a product identifier including iD barcodes, RFID, 2D codes, digital documents	1D barcodes and RFIDs are ubiquitous and will only be replaced slowly. Uptake should not require manufacturers to re-instrument their production lines and printing processes
Verifiability	UNTP should provide confidence in the integrity and trustworthiness of the data	without trustworthy data, the value of sustainability claims is reduced - possibly to the extent that the business case for adoption is non viable.
Any criteria	UNTP should not dictate any specific sustainability criteria but make the criteria transparent and allow criteria to be mapped	Costs will explode if every exporter must provide certification to every export market criteria. Where criteria are equivalent, mutual recognition provides a much more cost effective sustainability trajectory.
Action requires value	The benefits of UNTP implementation must exceed the costs.	If not then there will be no implementation

## UNTP conceptual overview

Our mission is to support global traceability and transparency **at scale**. To achieve that mission we must not only define the **data** standards but also solve all the barriers to adoption at scale. That includes how to **find** the data, how to **secure** the data, how to **understand** the data, and most critically, how to realise enduring business **value** from the data. These are the five pillars of UNTP.



Small scale tests are possible with any of these pillars missing but scalability to full production volumes is not.

## The data

The data is the heart of the UNTP. There are three different data types, each represented as digital verifiable credentials.

- The **Digital Product Passport (DPP)** is issued by the product manufacturer and is designed to carry basic product data plus the conformity (including sustainability) data that is needed by the next actor in the supply chain (ie the buyer of the product). The DPP represents the conformity information as a set of "claims" which specify product performance against specified criteria. In this way, the DPP is essentially a bundle of differentiated value that buyer can use to choose preferred supply. The DPP also provides a statement of material provenance (ie what materials is this product made from and where were the materials sourced). The provenance data assist with ensuring conformance to minimum local content rules or sources under sanction.
- The **Digital Conformity Credential (DCC)** is issued by an independent auditor or certifier and it carries one or more "assessments" of an identified product or facility against well defined criteria. When the product ID and the conformity criteria in the DCC "assessment" match those in the DPP "claim" then the DPP data value is enhanced through independent verification. The DCC also includes links to the accreditation authority so that verifiers can be sure that the auditor or certifier is genuine.

- **The Digital Traceability Event (DTE)** provides a means to trace product batch data throughout the value chain. The DTE links input products (eg bales of cotton from the primary producer) to output products (eg woven cotton fabric). Therefore the DTEs provide a means to trace product provenance through manufacturing processes to discover an entire value chain. DTEs are only available when products are managed and traceable at batch level. DTEs provide links to reach deeper into the value chain which may contain commercially sensitive data and so may only be available to authorised roles.

All three UNTP data structures are designed to be extensible to meet the needs of specific industry sectors or jurisdictions.

## Finding the data

We deliberately say "finding" the data rather than "exchanging" the data because a very critical principle is that the issuer of the data usually will not know who will ultimately use it. Obviously each seller knows their immediate buyer but many other actors in a circular economy may also encounter the identified product and need to access the DPP information. So a key principle of UNTP is "if you know the identifier of a product then you can get the data about the product" - even many years after the product was created.

- The **Digital Link Resolver (DLR)** specification is an extension of ISO-18975 that provides a standardised way to resolve an identifier (of a product, batch, item, facility or entity) to a list of links (URLs) to further information about the identified object. One identifier can resolve to multiple links, each with a specific link type (eg UNTP DPP). The DLR works with simple identifiers (eg encoded as a traditional 1D barcode) or complex identifiers (eg encoded as a QR code). In this way a single barcode or QR code can return a rich variety of information tailored to the requestor needs. Furthermore, the DLR can return a collection of similar link types with different date stamps or versions. One important use case for this capability is to return post-manufacture events such as consumption and eventual recycling of identified products.

## Securing the data

As the value of sustainability attributes increases, so the temptation to make fake claims increases. Without confidence in the integrity of data, value is diminished. Additionally, as businesses publish more and more data about their products and upstream value chains, there is an increased risk of leakage of commercially sensitive information. Without confidence that sensitive data is accessible only to authorised parties, businesses will be less likely to participate. The UNTP security specifications address these challenges.

- **Verifiable Credentials Profile (VCP).** All UNTP data objects (DPP, DCC, DTE, DIA) are issued as W3C Verifiable Credentials. This ensures that the data, once issued, cannot be tampered, that the issuer is identifiable, and that status changes like revocation are immediately visible. The VCP defines a simple subset of the larger W3C specifications so that interoperability is simpler and cheaper to achieve. The VCP also includes an human-readable rendering template extension to the W3C specification so that anyone can verify UNTP credentials even if they have no technology maturity.
- **Digital Identity Anchor (DIA).** The issuers and subjects of Verifiable credentials are identified using W3C Decentralised Identifiers (DIDs) which provide a means to discover the cryptographic keys necessary to verify the credentials. However, DIDs are self-issued and do not ensure that the issuer is really who they say they are, only that the owner of the DID was certainly the issuer of the credential. The DIA is a verifiable credential issued by a trusted authority (eg a government agency) that links a DID to a known public identity such as VAT registration number. In this way, verifiers can be assured of the identity of issuers. The DIA also has a "scope" so that, for example a national accreditation authority can attest to the identity of a certifier but also specify the scope of the accreditation.
- **Decentralised Access Control (DAC).** Not all traceability and transparency data for a given product is public information. Some is accessible only to authorised roles like a customs authority or a recycling facility. Some is accessible only to the verified purchaser of a product. In centralised systems, this kind of access control is managed by granting privileged access roles to authenticated users. But in decentralised systems such as the world of DPPs, this approach is not practical. There could be thousands of different platforms that host DPPs and it would be impractical for each authorised actor to create accounts on thousands of systems. The DAC defines a simple way to encrypt sensitive data with a unique key for every unique item and a way to distribute decryption keys to authorised roles without any advance knowledge about who has which role. Even if a decryption key is lost or leaked, the scope of data access is limited to one item. The DAC also provides a mechanism for the verified purchaser of an item to **update** the DPP record with post-sale events like consumption, repair, or recycling.

## Understanding the data

The UNTP data objects (DPP, DCC, DTE, DIA) are deliberately simple so that they are easy to understand and low cost to implement. However a lot of the structural simplicity of a DPP is achieved via the "claims" object which is a simple abstraction that can carry any sustainability or conformity metric measures against any criteria from any standard or regulation. So this simple abstraction hides a world of complexity. In a world of thousands of standards or regulations, each with dozens or hundreds of distinct criteria, how can one claim about social welfare or biodiversity be meaningfully compared to another? How can an importer know whether a product sustainability criteria from an exporting

economy is equivalent to the regulated criteria in the importer's economy? As a corporate subject to sustainability disclosures under IFRS or ESRS, how can I know how to match the claims in a received product passport with the impact areas of my disclosures statement? The UNTP cannot and should not dictate which sustainability standards or regulations any given claim or assessment references. However it can provide a way to map these criteria to a harmonised vocabulary.

- The **Sustainability Vocabulary Catalog (SVC)** provides a framework to map sustainability knowledge across different standards, regulations and industry practices. It may not always answer the question but it provides a decentralised semantic governance model that allows mappings and corresponding value to grow over time and gaps to be fixed as they are found. The SVC is a W3C DCAT conformant catalog of external sustainability standards and regulations. Mappings are defined using W3C SKOS and can be made either by UN working groups external standards **or** by external authorities to the UN catalog. This allows for a decentralised mapping effort that is far more scalable than depending on a small centralised team.

As uptake of UNTP grows, maintenance of the SVC is one of the key activities that grows with uptake and adds continuously increasing value to the global sustainability effort.

## Valuing the data

Without sufficient commercial incentive, businesses will not act. In some cases the commercial incentive is regulatory compliance. But few economies (The European Union is a notable exception) have current or emerging regulation that demands digital product passports for products sole or manufactured in their economy. However, there is much wider regulatory enforcement of annual corporate sustainability disclosures. But without sustainability data from supply chains at product level, there is no easy way for corporates to accurately meet their annual disclosure obligations. Worse, without product level data from suppliers, there is no way at all for corporates to select supply in such a way that they can demonstrate year-on-year improvements to sustainability performance. On top of the disclosure obligation, most corporates are very concerned about reputational risk associated with un-sustainable behaviour from their upstream suppliers. Furthermore, the financial sector is increasingly able and willing to provide improved financial terms for trade finance or investment capital to businesses with strong sustainability credentials. All these incentives drive behaviour and value but there is still some effort needed for each implementer to make a positive business case for change. UNTP offers some tools to determine the value that can inform a positive case for change.

- **Business Case Template (BCT).** A simple template for each role (buyer, supplier, certifier, software vendor, regulator, etc) to make a business case for the investment needed to implement UNTP. Continuously updated and improved with lessons from early implementations, the BCT provides a quick way for sustainability staff to support their budget requests.

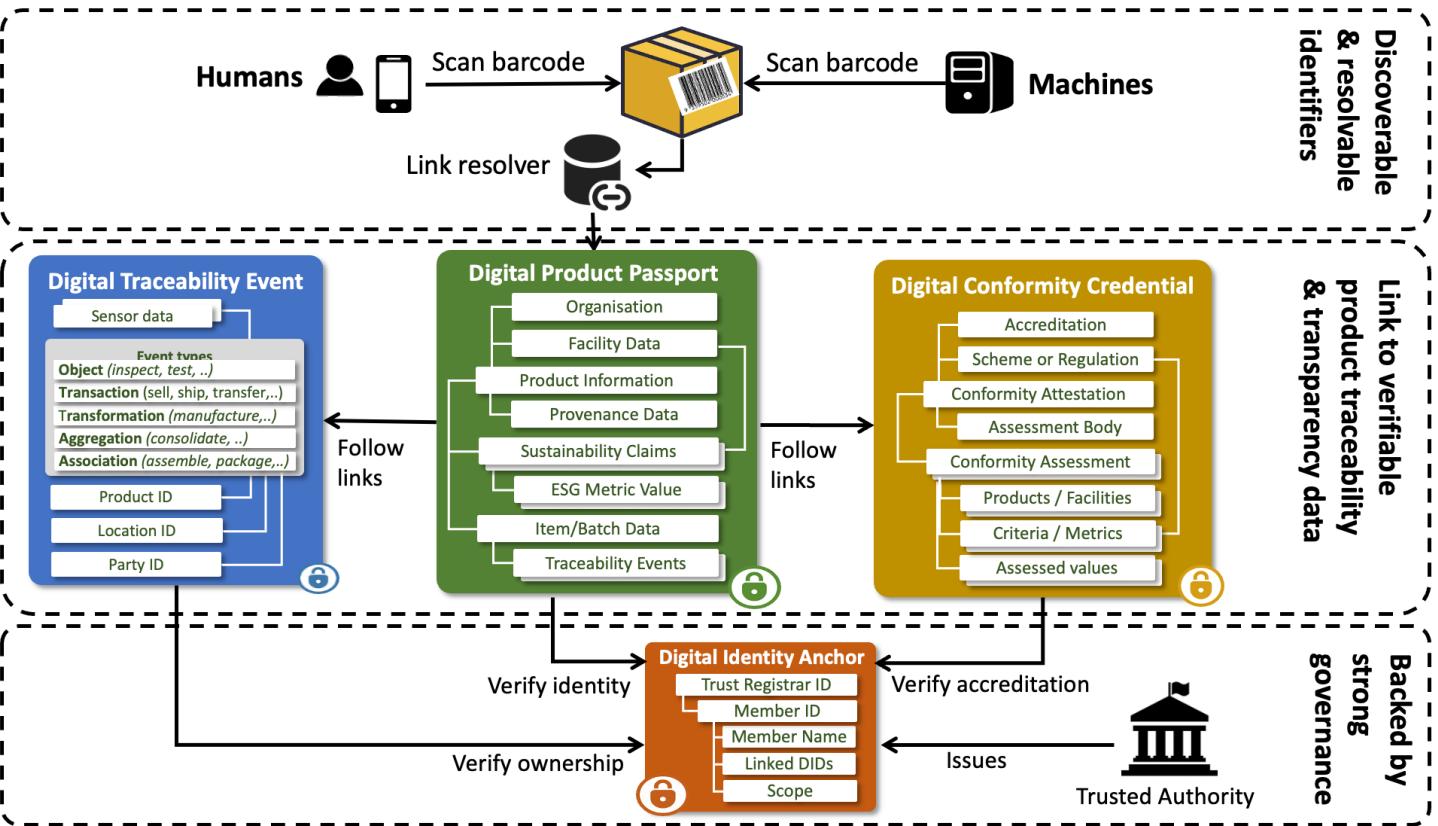
- **Community Activation Program (CAP).** Supply chain actors are often reluctant to proceed with a specific initiate like UNTP unless they have some confidence that others in their industry are doing the same. There are not only obvious interoperability benefits from industry wide adoption but also cost benefits. For example, it is often the case that a small number of commercial software platforms are commonly used by larger numbers of businesses in a given industry and jurisdiction. So a software vendor that implements UNTP once will benefit all its customers. Additionally there are often a few standards and a few certifiers that are common to an industry and country. Also, there is very often one or more existing member associations that represent most of the actors in a given industry and country. Finally, when a large community is willing to act together, there will often be financial incentives from governments and/or development banks that can assist with initial funding. In short, there are many reasons to approach uNTP implementation at a community level. The CAP is a business template for a community level adoption of UNTP including a tool for financial cost/benefit modelling at community level.
- **Value Assessment Framework (VAF).** Once a community or individual implements UNTP and transparency data starts to flow at scale, it will become important to continuously assess the actual value that is realised. Dashboards and scorecards that measure key performance indicators will energise ongoing action and provide valuable feedback at both community and UN level. Therefore the UNTP defines a minimal set of KPIs that each implementer can easily measure and report to their community - and which communities can report to the UN.

## UNTP for one product

This section drills down a little into the key credentials that UNTP defines to answer "what's in a product passport or conformity credential or traceability event?". The diagram shows the perspective of one product. The product identifier (at product, batch or item level) is the key for a Digital Link Resolver (DLR) to provide links to the UNTP credentials (and any other product related data). Every credential is both human and machine readable so that the same product scan will return a nicely formatted DPP and related data to a human scanning a barcode or QR code with their phone - or a structured digital data set to an automated scanner at the factory door.

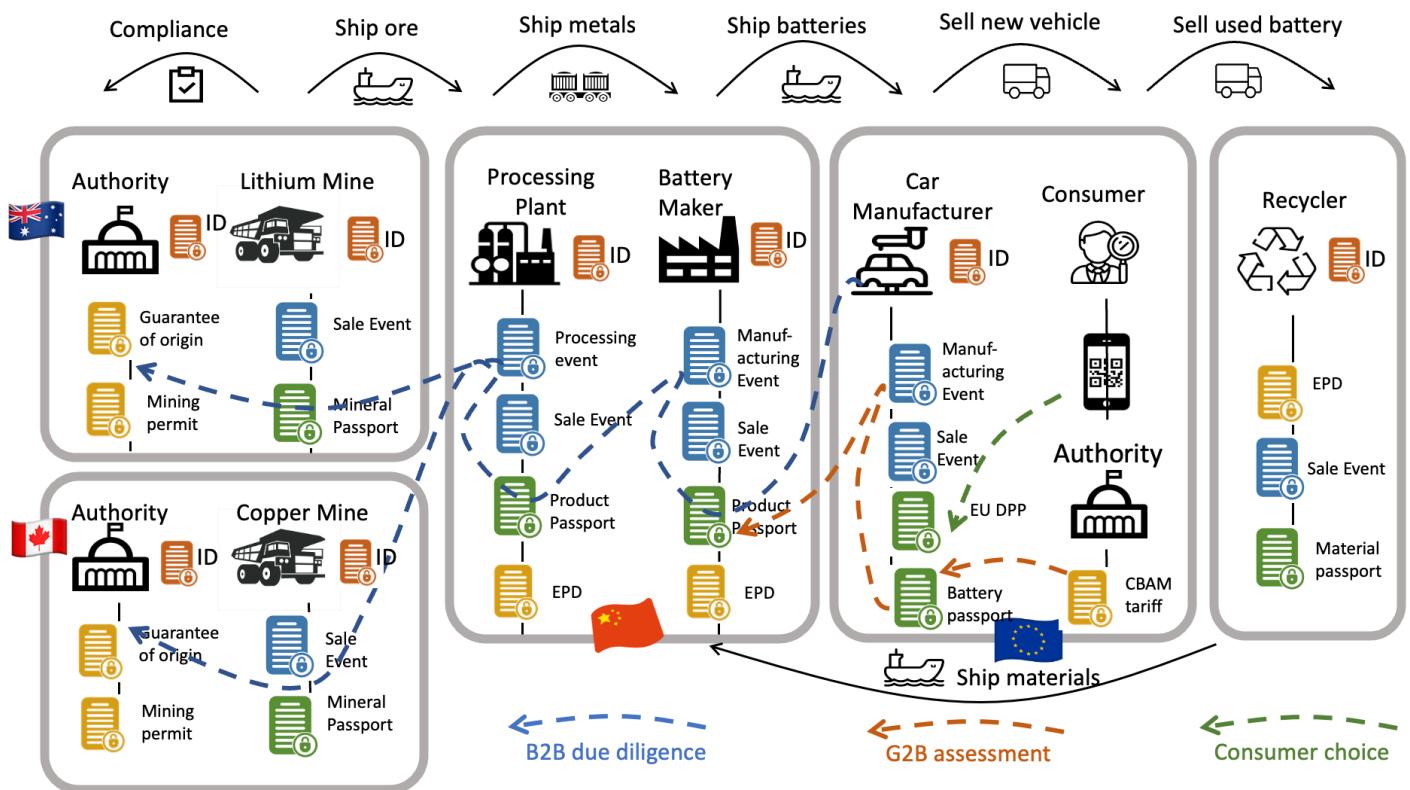
Summary and detailed information about the content of each UNTP credential is available on this site and need not be repeated here

- [Digital Product passport \(DPP\)](#)
- [Digital Conformity Credential \(DCC\)](#)
- [Digital Traceability Event \(DTE\)](#)



## UNTP for a value chain

When each actor in a value chain implements UNTP then it becomes possible to trace product provenance across value chains back to primary production. There is no need for all actors in a value chain to collaborate or to implement at the same time. In many cases, the timing and incentives in different industry sectors of the same value chain will be very different. For example a leather goods manufacturer will usually be unable to influence the behaviour of cattle farmers because leather is a by-product and their focus is on the food value chain. Nevertheless, when an agriculture sector implements UNTP for their own reasons, the leather manufacturer can still access the data because UNTP provides a traceability mechanism that crosses industry boundaries without requiring collaboration between those industry sectors. In the example below, a battery can be traced to raw material production even when, from the perspective of the miner, the copper in the anode represents a tiny fraction of production.



# Digital Product Passport

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Versions

DPP Version	Date	Status	JSON-LD Context	JS Sch
0.3.0	25-03-2024	Raw (not for implementation)	<a href="#">DPP context</a>	<a href="#">DPP schema</a>
0.4.0	08-04-2024	Raw (for review)	<a href="#">DPP context</a>	<a href="#">DPP schema</a>
0.5.0	04-06-2024	Raw (for review)	<a href="https://test.uncefact.org/vocabulary/untp/untp-v1.jsonld">https://test.uncefact.org/vocabulary/untp/untp-v1.jsonld</a>	<a href="#">DPP schema</a>

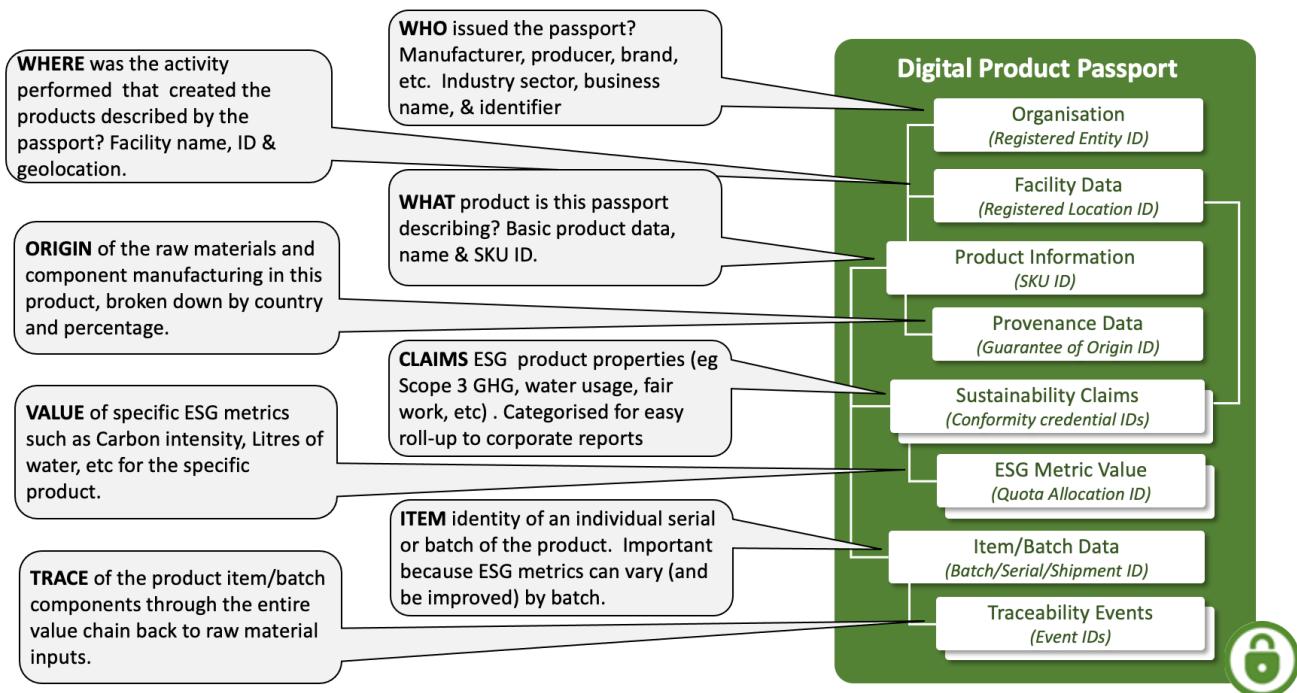
The current version of this specification is v0.4.0

## Overview

The digital product passport (DPP) is issued by the shipper of goods and is the carrier of **product and sustainability information** for every serialised product item (or product batch) that is shipped between actors in the value chain. It is deliberately **simple and lightweight** and is designed to carry the minimum necessary data at the **granularity** needed by the receiver of goods - such as the scope 3 emissions in a product shipment. The passport contains links to **conformity credentials** which add trust to the ESG claims in the passport. The passport also contains links to **traceability events** which

provide the "glue" to follow the linked-data trail (subject to confidentiality constraints) from finished product back to raw materials. The UNTP DPP does not conflict with national regulations such as the EU DPP. In fact, it can usefully be conceptualised as the **upstream B2B feedstock** that provides the data and evidence needed for the issuing of high quality national level product passports.

## Conceptual Model



## Requirements

The digital product passport is designed to meet the following detailed requirements as well as the more general [UNTP Requirements(<https://uncefact.github.io/spec-untp/docs/about/Requirements>)]

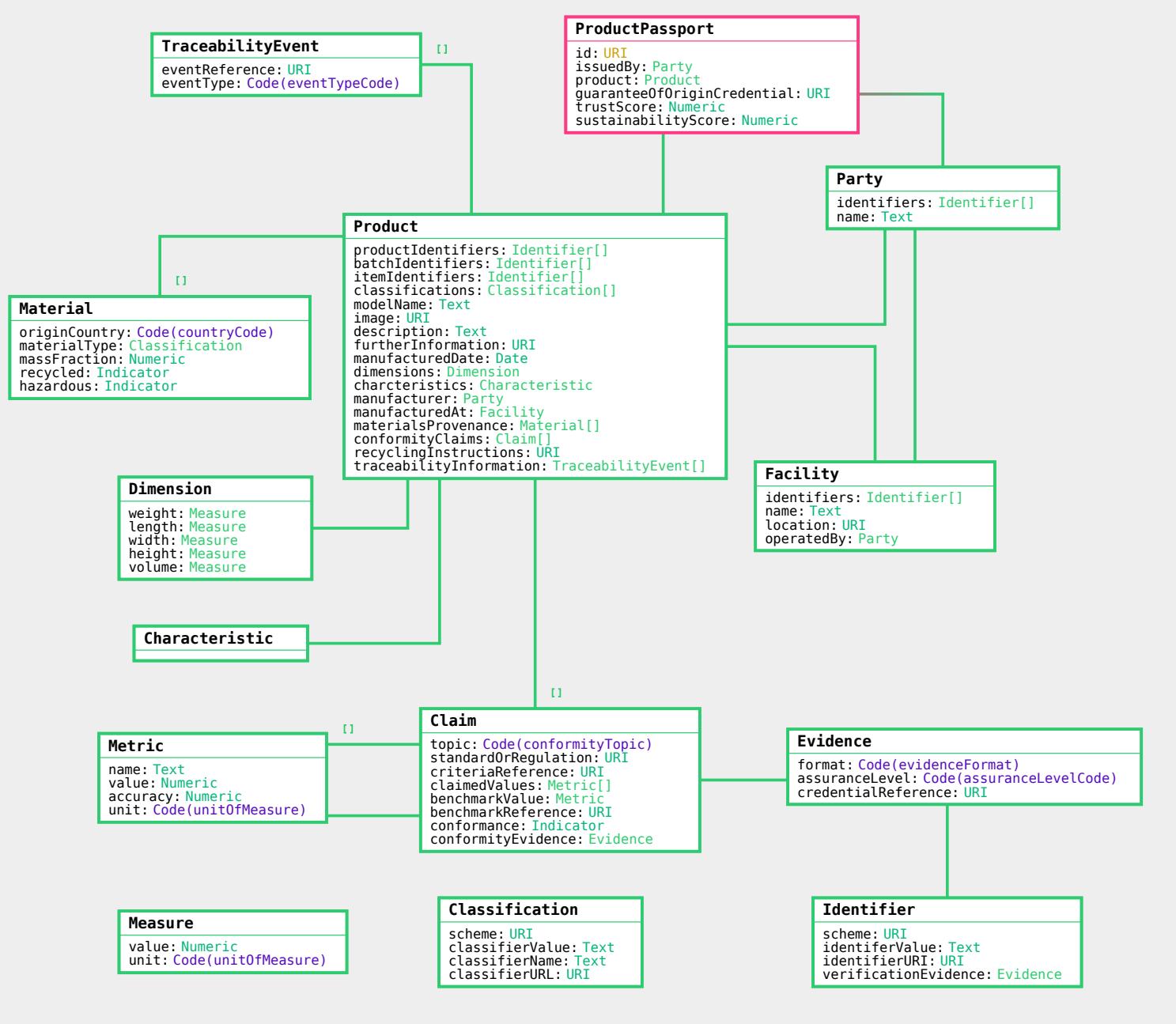
ID	Name	Requirement Statement	Solution Mapping
DPP-01	product, batch, item	The DPP should support use at either product level or at batch level or at individual serialised item level.	Claims are made at the passport level, which MUST have a related

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
			product and MAY have a related batch and item
DPP-02	Classification	The DPP should support any number of product classifications using codes from a defined classification scheme (eg UN-CPC)	The classifications property
DPP-03	Materials provenance	The DPP should provide a simple structure to allow issuers to breakdown the material composition of their products by mass fraction and origin country so that raw material provenance requirements are easily assessed and met.	The DPP "materialsProvenance" structure is designed to meet this need.
DPP-04	Manufactured at	The DPP should provide a simple structure to describe the manufacturing facility at which the product was made. The facility identifier SHOULD be resolvable and verifiable and SHOULD link to cadastral boundary information.	The "Facility" structure including the locationEvidence credential property is designed to meet this need
DPP-05	Dimensions	The DPP must support the definition of key product dimensions such as length, width, height, weight, volume so that conformity claims made at the unit level (eg Co2 intensity in Kg/Kg) can be used to calculate actual values for the shipped product	Dimensions class
DPP-06	Traceability	The DPP should provide a means to follow links to further DPPs and conformity credentials of constituent products so that (subject to confidentiality constraints), provenance claims can be verified to any arbitrary depth up to primary production	The links to EPCIS traceability event credentials from the productBatch class is designed to meet this need

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
DPP-07	characteristics	The DPP should allow issuer to provide descriptive information about the product (image, description, etc) that is extensible to meet industry specific needs.	Characteristics property as an industry extnesion point
DPP-08	Verifiable Party	The DPP should provide DPP issuer, product manufacturer, and facility operator identification inclding a name, a resolvable and verifiable identifier, and proof of ownership of the identifier	The Party structure inclding the "verification Evidence" property of the identifier class link meets this need
DPP-09	Claims	The DPP MUST provide a means to include any number of conformity claims within one DPP so that it can provide simple single point to aggregate all claims about the product in one place	The "conformityClaims" array is designed to meet this need
DPP-10	Conformity Topic	The DPP MUST provide a simple mechanism to express the sustainability/circularity/conformity topic for each claim so that similar claims can be grouped and the high level scope easily understood.	The ConformityTopic code list is designed to meet this need
DPP-11	Metrics	The DPP MUST provide a simple mechanism to quantify a conformity claims (eg carbin intensity, water consumption, etc) and to express any accuracy range and also to compare the claimed value to a relevant benchmark such as a standard/regulation requirement or an industry average	The "Metric" class is designed to meet this need
DPP-12	Criteria	The DPP MUST provide a means to reference a standard or regulation as well as the specific criteria within that standard	The standardorRegulation property points to the standard document and

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
		or regulation - so that claims can be understood inter terms of the criteria against which they are made.	the "criteria" property points to the specific rule or clause within that standard or regulation.
DPP-13	Evidence	The DPP MUST provide a means to reference independent conformity assessments that support and verify the claims being made. The related evidence SHOULD be digitally verifiable but MAY be a simple document or web page. The confidence level attached to the evidence should be clear.	The "Evidence" class is designed to meet this need, together with the evidence type and assurance level code lists.

## Logical Model



# Data Definitions

## ProductPassport

The ProductPassport is a comprehensive data structure that encapsulates various details pertaining to a product, including its identification details, who issued it, batch information, and different scores relating to sustainability and trustworthiness.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
id	A unique identifier (URI) assigned to the product passport.	URI
issuedBy	The Party that issued the product passport.	Party
product	Detailed information about the product encapsulated in a ProductInformation object.	Product
guaranteeOfOriginCredential	A conformity credential issued by a trusted authority that confirms some or all of the claims made in this product passport	URI
trustScore	An aggregate numeric metric that represents the level of trustworthiness associated with the product. This score is derived based on the credibility and reliability of the issuing bodies that substantiate the claims being made about the product. The calculation rules are defined in the UNTP trust graph specification.	Numeric
sustainabilityScore	An aggregate numeric metric calculated based on the various sustainability claims vs benchmarks associated with the product. It amalgamates scores assigned to individual sustainability claims, which are validated by various issuing bodies. The score provides a comprehensive view of the product's overall sustainability performance, giving users a quantifiable measure of the product's environmental and social impacts.	Numeric

## Party

The Party class represents an entity such as an organization, or a company that manufactured the product.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
identifiers	A unique identifier (URI) assigned to the organization or company. (Link Resolver - GS1 company prefix?)	Identifier
name	The name of the organization or company, represented as a text string.	Text

## Facility

The Facility class embodies information about a specific facility, which manufactured the product.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
identifiers	A unique identifier (URI) assigned to the facility. (Link Resolver - GS1 GLN?)	Identifier
name	The name of the facility, represented as a text string.	Text
location		URI
operatedBy	The Party entity responsible for operating the facility.	Party

## Product

The ProductInformation class encapsulates detailed information regarding a specific product, including its identification details, manufacturer, and other pertinent details.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
productIdentifiers	An array of unique identifiers assigned to the product or model.	Identifier
batchIdentifiers	Information regarding the specific production batch of the product.	Identifier
itemIdentifiers	An array of identifiers representing a specific	Identifier

Property	Definition	Type
	serialised item of the product.	
classifications	A code representing the product's class, typically using the UN CPC (United Nations Central Product Classification) <a href="https://unstats.un.org/unsd/classifications/Econ/cpc">https://unstats.un.org/unsd/classifications/Econ/cpc</a>	Classification
modelName	The model name or number of the product, represented as text.	Text
image	A unique identifier (URI) pointing to an image of the product.	URI
description	A textual description providing details about the product.	Text
furtherInformation	A URL pointing to further human readable information about the product.	URI
manufacturedDate	The ISO 8601 date on which the product batch was manufactured.	Date
dimensions	The physical dimensions of the product. Not every dimension is relevant to every products. For example bulk materials may have weight and volume but not length, width, or height.	Dimension
characteristics		Characteristic
manufacturer	The Party entity that manufactured the product.	Party
manufacturedAt	The Facility where the product batch was manufactured.	Facility
materialsProvenance	An array of Provenance objects providing details on the origin and mass fraction of components or	Material

<b>Property</b>	<b>Definition</b>	<b>Type</b>
	ingredients of the product batch.	
conformityClaims	An array of claim objects representing various product conformity claims about the product / batch. These can be sustainability claims, circularity claims, or any other claim type within the conformity topic list.	Claim
recyclingInstructions	A URI pointing to information regarding the recycling aspects of the product.	URI
traceabilityInformation	An array of TraceabilityEvent objects detailing EPCIS events related to the traceability of the product batch.	TraceabilityEvent

## Claim

The SustainabilityClaim class represents specific claims regarding the sustainability of a product, providing details about the metrics, thresholds, and evidences supporting the claim.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
topic	A code representing the topic of the sustainability claim. E.g. environment.deforestation, environment.ghg-emission-intensity, etc.. Drawn from a standard code list.	Code (conformityTopic)
standardOrRegulation	The standard or regulation against which this conformity claim is made. Expressed as a URI and should match a value in the UN catalogue of reference vocabularies.	URI
criteriaReference	A URI pointing to the specific criteria within the standard or regulation against which this claim is made.	URI

<b>Property</b>	<b>Definition</b>	<b>Type</b>
claimedValues	One or more actual measures supporting the claim. For example for GHG emissions there may be a metric for total emissions intensity and also a metric for amount of offsets included.	Metric
benchmarkValue	A benchmark value against which the claimed value can be assessed. This could be a value specified by a standard or regulation or could be an industry benchmark.	Metric
benchmarkReference	A reference to evidence to support the benchmark value.	URI
conformance	and indicator (boolean) that expresses whether or not this product has achieved compliance against the criteria. for example, if the topic is environment.deforestation and the criteria is EU.2023.1115 then the product is conformant if it has not touched any facility throughout its lifecycle that is not deforestation free since dec 2020.	Indicator
conformityEvidence	A URI pointing to the evidence supporting the claim. Most likely in the form of a verifiable credential.	Evidence

## Metric

A specific measure of performance against the criteria that governs the claim. Expressed as an array of metric (ie unit of measure) / value (ie the actual numeric value) pairs.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
name	A human readable name for this metric	Text

<b>Property</b>	<b>Definition</b>	<b>Type</b>
value	A numeric value representing the measurement or evaluation outcome for the claim.	Numeric
accuracy	A percentage represented as a numeric between 0 and 1 indicating the range of accuracy of the claimed value (eg 0.05 means that the actual value is within 5% of the claimed value.)	Numeric
unit	The unit of measure. for example, emissions intensity in Kg Co2e per kWh produced. Or Kg Co2e per Kg of livestock gross weight.	Code (unitOfMeasure)

## TraceabilityEvent

The TraceabilityEvent class represents a specific EPCIS event in the traceability chain of a product, including details about the event type and reference.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
eventReference	A URI pointing to the detailed information about the EPCIS event. Most likely in the form of a verifiable credential.	URI
eventType	A code representing the type of EPCIS event. ObjectEvent, AggregationEvent, TransactionEvent, TransformationEvent, ObjectEvent.	Code (eventTypeCode)

## Material

The material class encapsulates details about the origin or source of raw materials in a product, including the country of origin and the mass fraction.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
originCountry	A ISO 3166-1 code representing the country of origin of the component or ingredient.	Code (countryCode)

Property	Definition	Type
materialType	The type of this material - as a value drawn from a controlled vocabulary eg <a href="http://textileexchange.org/materials/rm01014">textileexchange.org/materials/rm01014</a> - representing organic cotton.	Classification
massFraction	A numeric value representing the mass fraction of the product represented by this material. The sum of all mass fraction values for a given passport should be 100.	Numeric
recycled	Indicator is true if this material input is from a recycled source.	Indicator
hazardous	Indicates whether this material is hazardous. If true then	Indicator

## Evidence

Evidence to support a conformity or identity claim.

Property	Definition	Type
format	Format of the evidence (verifiable credential, document, website, etc)	Code (evidenceFormat)
assuranceLevel	The assurance level of the evidence (self declaration, 2nd party, 3rd party, accredited auditor)	Code (assuranceLevelCode)
credentialReference	The URL of the evidence credential. Should be a hashlink to avoid post-issue tampering.	URI

## Dimension

Overall (length, width, height) dimensions and weight/volume of an item.

Property	Definition	Type
weight	the weight of the product	Measure
length	The length of the product or packaging	Measure
width	The width of the product or packaging	Measure
height	The height of the product or packaging	Measure
volume	The displacement volume of the product.	Measure

## Classification

A classification scheme and code / name representing a category value for a product, entity, or facility.

Property	Definition	Type
scheme	Classification scheme - eg <a href="https://unstats.un.org/unsd/classifications/Econ/cpc">https://unstats.un.org/unsd/classifications/Econ/cpc</a>	URI
classifierValue	classifier value within the scheme - eg "01211" in UN CPC	Text
classifierName	Name of the classifier - eg "Asparagus" for code "01211" in UNCPC	Text
classifierURL	Linked data URL to a web vocabulary entry for this classification code. When this property is provided, the scheme, value, and name properties of the classifier are not required. eg <a href="https://vocabulary.uncfact.org/unlocode?country=au#AUBNE">https://vocabulary.uncfact.org/unlocode?country=au#AUBNE</a> represents the port of Brisbane in the UN/LOCODE classification scheme.	URI

## Identifier

An identifier of a party, product, or facility that is defined by an identifier scheme and identifier value and, optionally, verification evidence

Property	Definition	Type
scheme	the identifier scheme as defined by the registrar that manages the identifier registry. If the identifier scheme is registered with UNTP then this URI can be used to discover the resolution method (to get more data) and the verification method (to prove ownership).	URI
identifierValue	The value of the identifier within the scheme	Text
identifierURI	The fully qualified URI representing the globally unique record for this identifier.	URI
verificationEvidence	Link to evidence that attests to the validity and ownership of the identifier.	Evidence

## Measure

The measure class defines a numeric measured value (eg 10) and a coded unit of measure (eg KG).

Property	Definition	Type
value	The numeric value of the measure	Numeric
unit	Unit of measure drawn from the UNECE rec20 measure code list.	Code (unitOfMeasure)

## Characteristic

Product specific characteristics. This class is an extension point for industry specific product characteristics or performance information such as clothing size or battery capacity.

## Code Tables

## conformityTopic

Name	Description
environment.energy	claims supporting clean energy transition
environment.emissions	claims supporting GHG emissions reduction
environment.water	claims supporting minimising water usage impact
environment.waste	claims supporting waste processing and reduction
environment.deforestation	claims supporting native forest restoration
environment.biodiversity	claims supporting improved biodiversity outcomes
circularity.content	claims supporting the use of recycled content in products
circularity.design	claims supporting product design for circularity outcomes
social.labour	claims supporting labour rights including fair wages
social.rights	claims supporting human rights and anti-discrimination
social.community	claims supporting local community development
social.safety	claims supporting process and product safety
governance.ethics	claims supporting ethical conduct and corporate governance
governance.compliance	claims supporting regulatory compliance including taxation and community protection
governance.transparency	claims supporting transparency and traceability

## unitOfMeasure

Code values for this table can be found here:  
<https://vocabulary.uncefact.org/UnitMeasureCode>

## eventTypeCode

Name	Description
aggregation	event describing the grouping of products such as placing bales of cotton on a pallet
transformation	event describing the consumption of input products to create output products in a manufacturing process such as spinning thread from cotton bales.
object	event describing an action on a single product such as an inspection or test
transaction	event describing commercial transactions such as the sale of a collection of products from seller to buyer
association	event describing the creation of relationships between products such as a bill of material of components in an assembly

## countryCode

Code values for this table can be found here:  
<https://vocabulary.uncefact.org/CountryId>

## evidenceFormat

Name	Description
w3c_vc	A W3C Verifiable Credential
iso_mdl	an ISO 108013 identity credential
document	a binary document for human consumption such as a PDF

Name	Description
website	a reference to an entry on a public website.
other	some other representation

## assuranceLevelCode

Name	Description
Self	self-assessment
Commercial	conformity assessment by related body or under commercial contract
Buyer	conformity assessment by potential purchaser
Membership	conformity assessment by industry representative body or membership body
Unspecified	conformity assessment by party with unspecified relationship
3rdParty	3rd party (independent) conformity assessment

## Sample

Note - this sample describes the digital product passport payload only - ie the subject of the verifiable credential without the envelope. Needs some more realistic data.

```
{
  "@context": [
    "https://www.w3.org/ns/credentials/v2",
    "https://test.uncefact.org/vocabulary/untp/untp-v1"
  ],
  "type": [
    "VerifiableCredential",
    "UNTPDigitalProductPassportCredential"
  ],
  "credentialSchema": {
    "type": "JsonSchema",
    "id": "https://test.uncefact.org/vocabulary/untp/untp-v1#UNTPDigitalProductPassportCredential"
  }
}
```

```
        "id": "https://uncefact.github.io/spec-untp/docs/specification/DigitalProductPassport"
    },
    "id": "urn:untp:e5adbeg6-2n1s-4669-bd54-321d903re998",
    "issuer": {
        "type": ["Organization"],
        "id": "did:web:zerowave.example.com",
        "name": "Zero Wave Riding Co."
    },
    "validFrom": "2023-06-22T10:00:00.000Z",
    "credentialSubject": {
        "type": ["UNTPDigitalProductPassport"],
        "product": {
            "type": ["Product"],
            "id": "https://shop.zerowave.example.com/cruizer",
            "batchIdentifiers": [
                "http://zerowave.example.com/01/09520123456788/10/ABC123"
            ],
            "itemIdentifiers": [
                "http://zerowave.example.com/01/09520123456788/21/12345",
                "http://zerowave.example.com/01/09520123456788/21/12346"
            ],
            "modelName": "Cruizer",
            "image": "https://shop.zerowave.example.com/media/cruizer.jpg",
            "description": "12kW, 3.6 kwh self-propulsion surfboard",
            "classifications": "eSurf",
            "furtherInformation": "https://shop.zerowave.example.com/cruizer",
            "manufacturedDate": "2024-05-08",
            "dimensions": {
                "type": "Dimensions",
                "weight": {
                    "value": 15.9,
                    "unit": "kg"
                },
                "length": {
                    "value": 169,
                    "unit": "cm"
                },
                "width": {
                    "value": 65.5,
                    "unit": "cm"
                }
            },
            "manufacturer": {
                "type": "Organization",
                "id": "did:web:hitech-assembly.example.com",
                "name": "Hitech Assembly, Inc.",
                "location": "Manufactured in the EU"
            }
        }
    }
}
```

```

},
"materialsProvenance": [
  {
    "type": "MaterialProvenance",
    "originCountry": "EU",
    "materialType": "EPP",
    "massFraction": 0.6,
    "recycled": true,
    "hazardous": false
  }
],
"conformityClaims": [
  {
    "type": "LinkRole",
    "target": "https://supplier.example.com/material/reuse-certificate",
    "linkRelationship": "untpConformity"
  },
  {
    "type": "LinkRole",
    "target": "https://supplier.example.com/manufacturing/carbon-emissions-certificate",
    "linkRelationship": "untpConformity"
  }
],
"recyclingInstructions": "http://brand-owner.example.com/nordic-pioneer/recycling",
"traceabilityInformation": [
  {
    "type": "UNTPAggregationEvent",
    "id": "http://manufacturer.example.com/293847293847"
  }
],
"guaranteeOfOriginCredential": "https://supplier.example.com/manufacturing/certificate-of-origin"
}
}

```

## Schema

**title:** UNTP Digital Product Passport Credential

**description:** The digital product passport (DPP) is issued by the shipper of goods and is the carrier of product and sustainability information for every serialised product item (or product batch) that is shipped between actors in the value chain. It is deliberately simple and lightweight and is designed to carry the minimum necessary

data at the granularity needed by the receiver of goods - such as the scope 3 emissions in a product shipment. The passport contains links to conformity credentials which add trust to the ESG claims in the passport. The passport also contains links to traceability events which provide the "glue" to follow the linked-data trail (subject to confidentiality constraints) from finished product back to raw materials. The UNTP DPP does not conflict with national regulations such as the EU DPP. In fact, it can usefully be conceptualised as the upstream B2B feedstock that provides the data and evidence needed for the issuing of high quality national level product passports.

```
type: object
properties:
  '@context':
    type: array
    readOnly: true
    const:
      - https://www.w3.org/ns/credentials/v2
      - https://test.uncefact.org/vocabulary/untp/untp-v1
  default:
    - https://www.w3.org/ns/credentials/v2
    - https://test.uncefact.org/vocabulary/untp/untp-v1
  items:
    type: string
    enum:
      - https://www.w3.org/ns/credentials/v2
      - https://test.uncefact.org/vocabulary/untp/untp-v1
type:
  type: array
  readOnly: true
  const:
    - VerifiableCredential
    - UNTPDigitalProductPassportCredential
  default:
    - VerifiableCredential
    - UNTPDigitalProductPassportCredential
  items:
    type: string
    enum:
      - VerifiableCredential
      - UNTPDigitalProductPassportCredential
id:
  type: string
  format: uri
credentialSchema:
  type: object
  properties:
    id:
      title: Schema URL
      description: The url of the schema file to validate the shape of the json
```

```
object
  type: string
  format: uri
  const: https://uncefact.github.io/spec-
untp/docs/specification/DigitalProductPassport
  type:
    title: Type
    description: The type of validation to be run against the defined schema
    const: JsonSchema
  additionalProperties: false
  required:
    - type
    - id
  validFrom:
    type: string
    format: date-time
  validTo:
    type: string
    format: date-time
  issuer:
    title: Issuer Organization
    type: object
    properties:
      type:
        type: array
        readOnly: true
        const:
          - Organization
        default:
          - Organization
      items:
        type: string
        enum:
          - Organization
  id:
    title: Issuer's Identifier
    description: Issuing organization identifier, typically a Decentralized
Identifier (DID).
    type: string
  name:
    title: Name
    description: Issuing organization name.
    type: string
  street:
    title: Street
    description: The street address expressed as free form text. The street
address is printed on paper as the first lines below the name. For example, the name
of the street and the number in the street, or the name of a building.
```

```
    type: string
  locality:
    title: Locality
    description: The locality in which the street address is, and which is in the
region; for example, a city or town.
    type: string
  region:
    title: State
    description: Text specifying a province or state in abbreviated format; for
example, NJ.
    type: string
  postalCode:
    title: Postal Code
    description: Text specifying the postal code for an address.
    type: string
  country:
    title: Country
    description: The two-letter ISO 3166-1 alpha-2 country code.
    type: string
additionalProperties: false
required:
- type
- id
- name
credentialSubject:
  type: object
properties:
  type:
    type: array
    readOnly: true
    const:
      - UNTPDigitalProductPassport
  default:
    - UNTPDigitalProductPassport
  items:
    type: string
    enum:
      - UNTPDigitalProductPassport
product:
  title: Product
  type: object
  properties:
    type:
      type: array
      readOnly: true
      const:
        - Product
    default:
```

```

        - Product
    items:
        type: string
    enum:
        - Product
modelName:
    title: Model Name
    description: Model name of the product.
    type: string
guaranteeOfOriginCredential:
    title: Guarantee of Origin Credential
    type: string
    format: uri
required:
    - type
required:
- '@context'
- type
- credentialSchema
- validFrom
- issuer
- credentialSubject

```

## Examples from pilot projects

Project	DPP Version	Description	Credential	Rendered View
AATP	0.1.0	Packaged Meat DPP	<a href="#">sample DPP VC</a>	<a href="#">DPP VC Viewer</a>

# Conformity Credential

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Versions

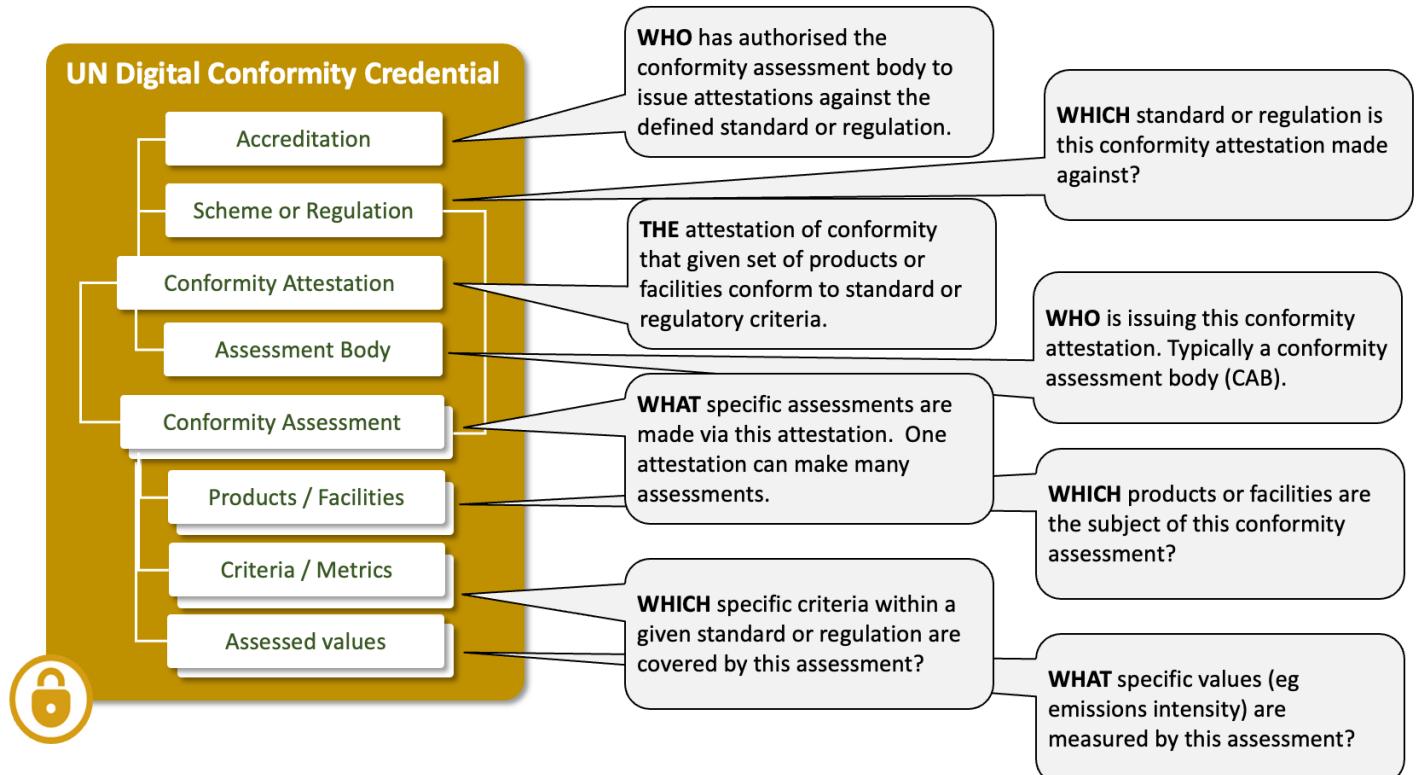
DPCC Version	Date	status	JSON-LD Context
0.2.0	06-04-2024	Raw (not for implementation)	DPP context - TBA

The current version of this specification is v0.2.0

## Overview

Conformity credentials are usually issued by independent third parties and provide a **trusted assessment** of product ESG performance against credible **standards or regulations**. As such the credential provides trusted verification of the ESG claims in the passport. Since the passport may make several independent claims (eg emissions intensity, deforestation free, fair work, etc) there may be many linked conformity credentials referenced by one passport. As an additional trust layer, the conformity credential may reference an **accreditation** credential that attests to the authority of the third party to perform the specific ESG assessments. The conformity credential data model has been developed by a separate UN/CEFACT project on digital conformity that has expert membership from accreditation authorities and conformity assessment bodies.

## Conceptual Model



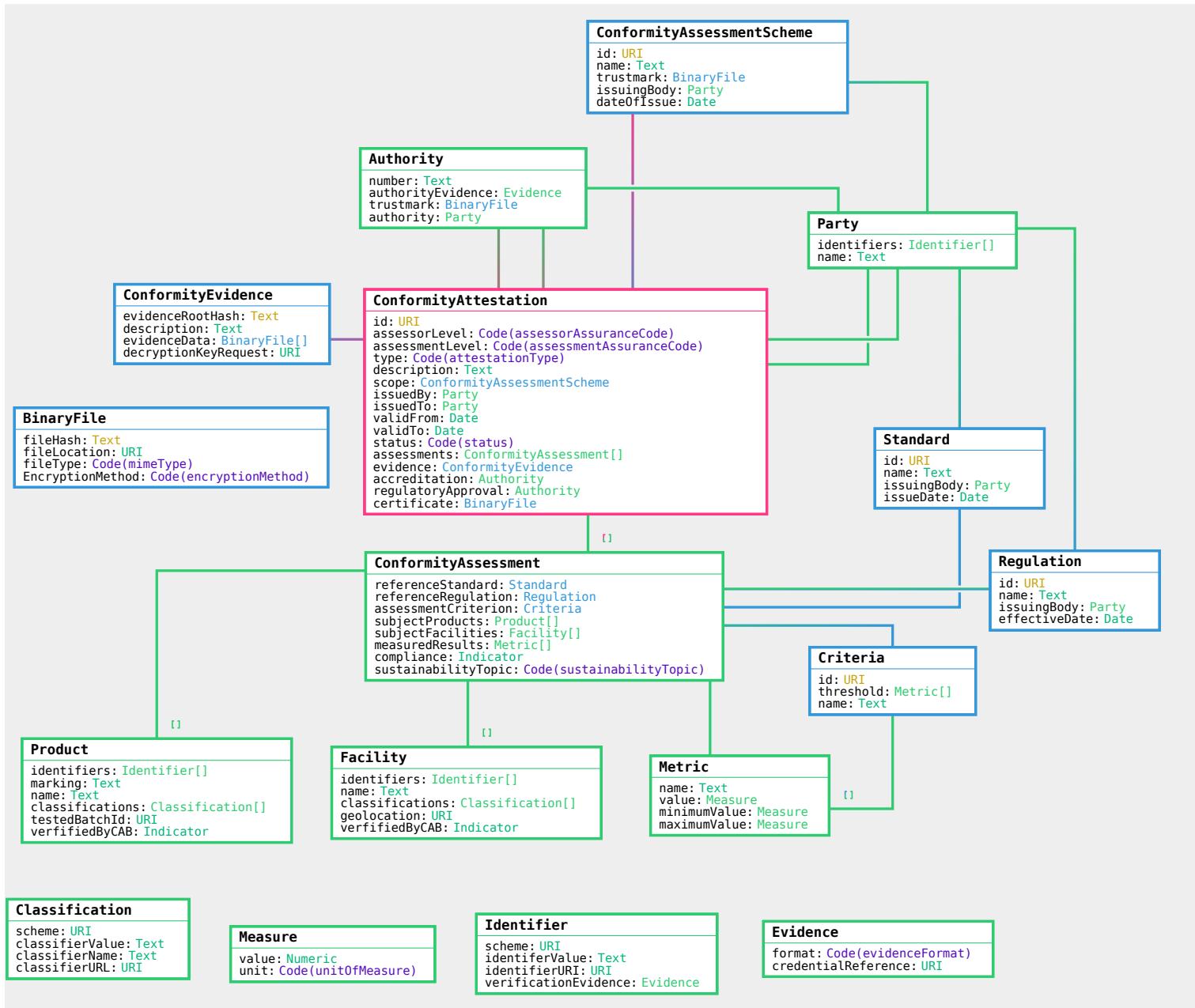
# Requirements

The digital product conformity credential (DPCC) is designed to meet the following detailed requirements as well as the more general [UNTP Requirements(<https://unecfact.github.io/spec-untp/docs/about/Requirements>)]

ID	Name	Requirement Statement	Solution Mapping
DPCC-01	Authorised source	The DPCC MUST be verifiable as issued by an authorised source, typically a conformity assessment body (CAB)	DPCC MUST be issued as a digital <b>verifiable credential</b> signed by the CAB
DPCC-01	Assurance level	The DPCC MUST identify the nature of any authority or support for attestation, such as formal recognition by a Governmental authority or an Accreditation Body	Authority

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
DPCC-03	Subject of conformity	The DPCC MUST unambiguously identify the subject of the conformity assessment, whether a product or facility.	Product, Facility
DPCCE-04	Reference standard or regulation	The DPCC MUST identify the reference standard(s) and/or regulation(s) that specify the criteria against which the conformity assessment is made. If appropriate this must include specific measurable thresholds (eg minimum tensile strength)	Standard, Regulation, Metric
DPCC-05	Conformity Attestation	The DPCCE MUST unambiguously state whether or not the subject of the assessment is conformant to the reference standard or regulation criteria	Assessment
DPCC-06	Measured metrics	The DPCCE SHOULD include actual measured values (eg emissions intensity, tensile strength, etc) with the conformity assessment	metric
DPCC-07	Evidence	The DPCCE MAY include references to auditable evidence (eg instrument recordings, satellite images, etc) to support the assessment. If so then the hash of the evidence fileset SHOULD be included (so that an auditor can be sure that the evidence data has not changed). The evidence data MAY be encrypted with decryption keys provided on request	Conformity Evidence

## Logical Model



# Data Definitions

## ConformityAttestation

A conformity attestation issued by a competent body that defines one or more assessments (eg carbon intensity) about a product (eg battery) against a specification (eg LCA method) defined in a standard or regulation.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
id	The unique identifier of this conformity attestation	URI
assessorLevel	Assurance code pertaining to assessor (relation to the object under assessment)	Code (assessorAssuranceCode)
assessmentLevel	Assurance pertaining to assessment (any authority or support for the assessment process)	Code (assessmentAssuranceCode)
type	The type of criterion (optional or mandatory).	Code (attestationType)
description	A textual description of the scope or purpose of this conformity attestation	Text
scope	A list of relevant standards and/or regulations against which apply to this attestation (eg AS1163:2016).	ConformityAssessmentScheme
issuedBy	The party that issued the conformity attestation.	Party
issuedTo	The party to whom the conformity attestation was issued.	Party
validFrom	The date from which the conformity attestation is valid.	Date
validTo	The date until which the conformity attestation is valid.	Date
status	The status of this conformity attestation (eg pending, valid, expired, revoked)	Code (status)

<b>Property</b>	<b>Definition</b>	<b>Type</b>
assessments	The list of specific assessments made within this conformity attestation.	ConformityAssessment
evidence	Evidence supporting the assessment	ConformityEvidence
accreditation	The accreditation from a competent authority (eg NATA) that confirms the issuers authorised scope of assessments.	Authority
regulatoryApproval	The regulatory approval under which this conformity attestation is issued.	Authority
certificate	A reference to the human / printable version of this conformity attestation - typically represented as a PDF document. The document may have more details than are represented in the digital attestation.	BinaryFile

## ConformityAssessmentScheme

A formal governance scheme under which this attestation is issued (eg ACRS structural steel certification)

<b>Property</b>	<b>Definition</b>	<b>Type</b>
id	THE unique identifier of the formal scheme (eg steelcertification.com/product-certification)	URI
name	The name of the conformity scheme (eg ACRS structural steel certification)	Text
trustmark	The trust mark that represents the conformity assessment scheme.	BinaryFile
issuingBody	The issuing body of the conformity scheme.	Party

<b>Property</b>	<b>Definition</b>	<b>Type</b>
dateOfIssue	The date of issue of the scheme.	Date

## Facility

The physical site (eg farm or factory) where the product or materials was produced.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
identifiers	A unique, resolvable, and verifiable identifier for the facility (eg <a href="https://maps.app.goo.gl/ULJFeVuA75M8cuQc8">https://maps.app.goo.gl/ULJFeVuA75M8cuQc8</a> )	Identifier
name	The name of this facility	Text
classifications	The UN CPC service classification for the activities undertaken at this facility.	Classification
geolocation	The geolocated point or area that can be used to place the location on a map. Should be a PlusCode - eg <a href="https://plus.codes/4RQGGVGP+">https://plus.codes/4RQGGVGP+</a>	URI
verifiedByCAB	Indicates whether the conformity assessment body has verified the identity of the subject of the assessment (a facility or product / batch).	Indicator

## Product

The facility (factory, farm, etc) or product or production batch that this conformity attestation is about.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
identifiers	A unique, resolvable, and verifiable identifier for the product (eg <a href="https://id.gs1.org/gtin/5000127163096">id.gs1.org/gtin/5000127163096</a> )	Identifier

Property	Definition	Type
marking	Markings or codes on the product that can be used to match the physical product to this conformity assessment. if not provided then the productID MUST be marked on the product.	Text
name	the name of this product as defined by the manufacturer or retailer.	Text
classifications	The UN CPC product classification code.	Classification
testedBatchId	A unique, resolvable, and verifiable identifier for the product serial number or batch (eg id.gs1.org/gtin/614141123452/lot/ABC1/ser/12345?exp=180426)	URI
verifiedByCAB	Indicates whether the conformity assessment body has verified the identity of the subject of the assement (a facility or product / batch).	Indicator

## ConformityAssessment

A specific assessment about the product or facility against a specific specification. Eg the carbon intensity of a given product or batch.

Property	Definition	Type
referenceStandard	The reference to the standard that defines the specification / criteria	Standard
referenceRegulation	The reference to the regulation that defines the assessment criteria	Regulation
assessmentCriterion	The specification against which the assessment is made.	Criteria

<b>Property</b>	<b>Definition</b>	<b>Type</b>
subjectProducts	The list of products that are the subject of this conformity assessment	Product
subjectFacilities	The list of facilities that are the subject of this conformity assessment.	Facility
measuredResults	The list of specific values measured as part of this assessment (eg tensile strength)	Metric
compliance	An indicator of whether or not the assessment meets the specification.	Indicator
sustainabilityTopic	The UN ESG topic category for this assessment (eg vocabulary.uncerfact.org/sustainability/emissions)	Code (sustainabilityTopic)

## Metric

A numeric value of the conformity claim - eg this product scope 1 emissions intensity is 5 KgCo2e/Kg

<b>Property</b>	<b>Definition</b>	<b>Type</b>
name	A short name for the metric - eg emissions intensity	Text
value	The measured value.	Measure
minimumValue	maximum measured or allowed value	Measure
maximumValue	minimum measured or allowed value	Measure

## ConformityEvidence

The specific collection of evidence that was used to inform the conformity claim. Eg satellite images and supporting declarations in support of a deforestation claim.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
evidenceRootHash	An MD5 hash representing the root of the evidence.	Text
description	A textual description of the evidence.	Text
evidenceData	Files that constitute the evidence.	<a href="#">BinaryFile</a>
decryptionKeyRequest	A URI to request the decryption key for the evidence.	URI

## BinaryFile

A file representing a data snapshot that is used to inform the conformity assessment.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
fileHash	The MD5 hash of the file.	Text
fileLocation	The location of the evidence file.	URI
fileType	The type of file, represented as a MIME type.	Code (mimeType)
EncryptionMethod	A code indicating the encryption method applied to the file.	Code (encryptionMethod)

## Authority

The authority under which a conformity claim is issued. For example a national accreditation authority may accredit a test lab to issue test certificates about a product against a standard.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
number	The reference number for the accreditation - issued by the accreditation body (AB) to the conformity assessment body (CAB)	Text

Property	Definition	Type
authorityEvidence	The evidence that supports the authority under which the attestation is issued - eg an accreditation certificate.	Evidence
trustmark	The trust mark image awarded by the AB to the CAB to indicate accreditation.	BinaryFile
authority	The competent authority that issued the accreditation.	Party

## Standard

A standard (eg ISO 14000) that specifies the criteria for conformance.

Property	Definition	Type
id	A unique identifier for the standard (eg <a href="https://www.iso.org/standard/60857.html">https://www.iso.org/standard/60857.html</a> ).	URI
name	The name of the standard (eg ISO 14001 Environmental management system)	Text
issuingBody	The party that issued the standard	Party
issueDate	The date when the standard was issued.	Date

## Regulation

A regulation (eg EU deforestation regulation) that defines the criteria for assessment.

Property	Definition	Type
id	The identifier of the regulation - eg <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115">https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1115</a>	URI
name	The name of the regulation - eg EU deforestation regulation.	Text

<b>Property</b>	<b>Definition</b>	<b>Type</b>
issuingBody	the issuing body of the regulation.	Party
effectiveDate	the date at which the regulation came into effect.	Date

## Criteria

A specific rule or criterion within a standard or regulation. eg a carbon intensity calculation rule within an emissions standard.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
id	A unique identifier for the criterion - managed by the standards authority or regulator.	URI
threshold	A conformity threshold defined by the specification (eg minimum compressive strength)	Metric
name	A name that describes this criteria (eg tensile strength)	Text

## Party

A party in the conformity domain such as the manufacturer, assessment body, standards authority, accreditation authority, etc

<b>Property</b>	<b>Definition</b>	<b>Type</b>
identifiers	A unique, resolvable and verifiable identifier for the party (eg abr.business.gov.au/ABN/90664869327)	Identifier
name	The name of the party - should match the name in the corresponding formal register.	Text

## Evidence

Evidence to support a conformity or identity claim.

Property	Definition	Type
format	Format of the evidence (verifiable credential, document, website, etc)	Code (evidenceFormat)
credentialReference	The URL of the evidence credential. Should be a hashlink to avoid post-issue tampering.	URI

## Classification

A classification scheme and code / name representing a category value for a product, entity, or facility.

Property	Definition	Type
scheme	Classification scheme - eg <a href="https://unstats.un.org/unsd/classifications/Econ/cpc">https://unstats.un.org/unsd/classifications/Econ/cpc</a>	URI
classifierValue	classifier value within the scheme - eg "01211" in UN CPC	Text
classifierName	Name of the classifier - eg "Asparagus" for code "01211" in UNCPC	Text
classifierURL	Linked data URL to a web vocabulary entry for this classification code. When this property is provided, the scheme, value, and name properties of the classifier are not required. eg <a href="https://vocabulary.uncfact.org/unlocode#AUBNE">https://vocabulary.uncfact.org/unlocode#AUBNE</a> represents the port of Brisbane in the UN/LOCODE classification scheme.	URI

## Identifier

An identifier of a party, product, or facility that is defined by an identifier scheme and identifier value and, optionally, verification evidence

Property	Definition	Type
scheme	the identifier scheme as defined by the registrar that manages the identifier registry. If the identifier scheme is registered with UNTP then this URI can be used to discover the resolution method (to get more data) and the verification method (to prove ownership).	URI
identifierValue	The value of the identifier within the scheme	Text
identifierURI	The fully qualified URI representing the globally unique record for this identifier.	URI
verificationEvidence	Link to evidence that attests to the validity and ownership of the identifier.	Evidence

## Measure

The measure class defines a numeric measured value (eg 10) and a coded unit of measure (eg KG).

Property	Definition	Type
value	The numeric value of the measure	Numeric
unit	Unit of measure drawn from the UNECE rec20 measure code list.	Code (unitOfMeasure)

## Code Tables

### assessorAssuranceCode

Code that describes the assurance level of the conformity assessment

Name	Description
Self	self-assessment
Commercial	conformity assessment by related body or under commercial contract
Buyer	conformity assessment by potential purchaser
Membership	conformity assessment by industry representative body or membership body
Unspecified	conformity assessment by party with unspecified relationship
3rdParty	3rd party (independent) conformity assessment

## assessmentAssuranceCode

Name	Description
GovtApproval	conformity assessment delivered under authority granted by national government
GlobalMLA	conformity assessment delivered under authority granted by IAF/ILAC signatory body
Accredited	conformity assessment delivered under an independent accreditation
Verified	conformity assessment externally verified
Validated	conformity assessment externally validated
Unspecified	conformity assessment claiming no external authority or else unspecified

## attestationType

A code for the type of the attestation credential

<b>Code</b>	<b>Description</b>
certification	A formal third party certification of conformity
declaration	A self assessed declaration of conformity
inspection	An Inspection report
testing	A test report
verification	A verification report
validation	A validation report
calibration	An equipment calibration report

## status

Code values for this table are derived from the state lifecycle chart: null

**value**

## sustainabilityTopic

<b>Name</b>	<b>Description</b>
environment.energy	claims supporting clean energy transition
environment.emissions	claims supporting GHG emissions reduction
environment.water	claims supporting minimising water usage impact
environment.waste	claims supporting waste processing and reduction
environment.deforestation	claims supporting native forest restoration

Name	Description
environment.biodiversity	claims supporting improved biodiversity outcomes
circularity.content	claims supporting the use of recycled content in products
circularity.design	claims supporting product design for circularity outcomes
social.labour	claims supporting labour rights including fair wages
social.rights	claims supporting human rights and anti-discrimination
social.community	claims supporting local community development
social.safety	claims supporting process and product safety
governance.ethics	claims supporting ethical conduct and corporate governance
governance.compliance	claims supporting regulatory compliance including taxation and community protection
governance.transparency	claims supporting transparency and traceability

## mimeType

Code values for this table can be found here:  
<https://mimetype.io/all-types>

## encryptionMethod

Name	Value	Description
none		no encryption
AES		AES standard

## evidenceFormat

A code describing the format of the conformity evidence

Name	Description
w3c_vc	A W3C Verifiable Credential
iso_mdl	an ISO 108013 identity credential
document	a binary document for human consumption such as a PDF
website	a reference to an entry on a public website.
other	some other representation

## unitOfMeasure

UNECE Recommendation 20 Unit of Measure codelist

Code values for this table can be found here:  
<https://vocabulary.uncefact.org/UnitMeasureCode>

## Sample

```
{
  "id": "http://example.com",
  "assessorLevel": "Self",
  "assessmentLevel": "GovtApproval",
  "type": "certification",
  "description": "string",
  "scope": {
    "id": "http://example.com",
    "name": "string",
    "trustmark": {
      "fileHash": "string",
      "fileLocation": "http://example.com",
      "fileType": "string",
      "EncryptionMethod": "none"
    }
  }
}
```

```
},
"issuingBody": {
  "identifiers": [
    {
      "scheme": "http://example.com",
      "identifierValue": "string",
      "identifierURI": "http://example.com",
      "verificationEvidence": {
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
      }
    }
  ],
  "name": "string"
},
"dateOfIssue": "2019-08-24"
},
"issuedBy": {
  "identifiers": [
    {
      "scheme": "http://example.com",
      "identifierValue": "string",
      "identifierURI": "http://example.com",
      "verificationEvidence": {
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
      }
    }
  ],
  "name": "string"
},
"issuedTo": {
  "identifiers": [
    {
      "scheme": "http://example.com",
      "identifierValue": "string",
      "identifierURI": "http://example.com",
      "verificationEvidence": {
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
      }
    }
  ],
  "name": "string"
},
"validFrom": "2019-08-24",
"validTo": "2019-08-24",
"status": "string",
```

```
"assessments": [
  {
    "referenceStandard": {
      "id": "http://example.com",
      "name": "string",
      "issuingBody": {
        "identifiers": [
          {
            "scheme": "http://example.com",
            "identifierValue": "string",
            "identifierURI": "http://example.com",
            "verificationEvidence": {
              "format": "w3c_vc",
              "credentialReference": "http://example.com"
            }
          }
        ],
        "name": "string"
      },
      "issueDate": "2019-08-24"
    },
    "referenceRegulation": {
      "id": "http://example.com",
      "name": "string",
      "issuingBody": {
        "identifiers": [
          {
            "scheme": "http://example.com",
            "identifierValue": "string",
            "identifierURI": "http://example.com",
            "verificationEvidence": {
              "format": "w3c_vc",
              "credentialReference": "http://example.com"
            }
          }
        ],
        "name": "string"
      },
      "effectiveDate": "2019-08-24"
    },
    "assessmentCriterion": {
      "id": "http://example.com",
      "threshold": [
        {
          "name": "string",
          "value": {
            "value": 0,
            "unit": "string"
          }
        }
      ]
    }
  }
]
```

```
        },
        "minimumValue": {
            "value": 0,
            "unit": "string"
        },
        "maximumValue": {
            "value": 0,
            "unit": "string"
        }
    }
],
"name": "string"
},
"subjectProducts": [
{
    "identifiers": [
        {
            "scheme": "http://example.com",
            "identifierValue": "string",
            "identifierURI": "http://example.com",
            "verificationEvidence": {
                "format": "w3c_vc",
                "credentialReference": "http://example.com"
            }
        }
    ],
    "marking": "string",
    "name": "string",
    "classifications": [
        {
            "scheme": "http://example.com",
            "classifierValue": "string",
            "classifierName": "string",
            "classifierURL": "http://example.com"
        }
    ],
    "testedBatchId": "http://example.com",
    "verfifiedByCAB": true
}
],
"subjectFacilities": [
{
    "identifiers": [
        {
            "scheme": "http://example.com",
            "identifierValue": "string",
            "identifierURI": "http://example.com",
            "verificationEvidence": {

```

```
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
    }
],
"name": "string",
"classifications": [
{
    "scheme": "http://example.com",
    "classifierValue": "string",
    "classifierName": "string",
    "classifierURL": "http://example.com"
}
],
"geolocation": "http://example.com",
"verifiedByCAB": true
},
],
"measuredResults": [
{
    "name": "string",
    "value": {
        "value": 0,
        "unit": "string"
    },
    "minimumValue": {
        "value": 0,
        "unit": "string"
    },
    "maximumValue": {
        "value": 0,
        "unit": "string"
    }
}
],
"compliance": true,
"sustainabilityTopic": "environment.energy"
}
],
"evidence": {
    "evidenceRootHash": "string",
    "description": "string",
    "evidenceData": [
{
    "fileHash": "string",
    "fileLocation": "http://example.com",
    "fileType": "string",
    "EncryptionMethod": "none"
}
```

```
        }
    ],
    "decryptionKeyRequest": "http://example.com"
},
"accreditation": {
    "number": "string",
    "authorityEvidence": {
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
    },
    "trustmark": {
        "fileHash": "string",
        "fileLocation": "http://example.com",
        "fileType": "string",
        "EncryptionMethod": "none"
    },
    "authority": {
        "identifiers": [
            {
                "scheme": "http://example.com",
                "identifierValue": "string",
                "identifierURI": "http://example.com",
                "verificationEvidence": {
                    "format": "w3c_vc",
                    "credentialReference": "http://example.com"
                }
            }
        ],
        "name": "string"
    }
},
"regulatoryApproval": {
    "number": "string",
    "authorityEvidence": {
        "format": "w3c_vc",
        "credentialReference": "http://example.com"
    },
    "trustmark": {
        "fileHash": "string",
        "fileLocation": "http://example.com",
        "fileType": "string",
        "EncryptionMethod": "none"
    },
    "authority": {
        "identifiers": [
            {
                "scheme": "http://example.com",
                "identifierValue": "string",
                "identifierURI": "http://example.com"
            }
        ]
    }
}
```

```
"identifierURI": "http://example.com",
"verificationEvidence": [
    "format": "w3c_vc",
    "credentialReference": "http://example.com"
]
],
"name": "string"
},
},
"certificate": {
    "fileHash": "string",
    "fileLocation": "http://example.com",
    "fileType": "string",
    "EncryptionMethod": "none"
}
}
```

# Traceability Events

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Versions

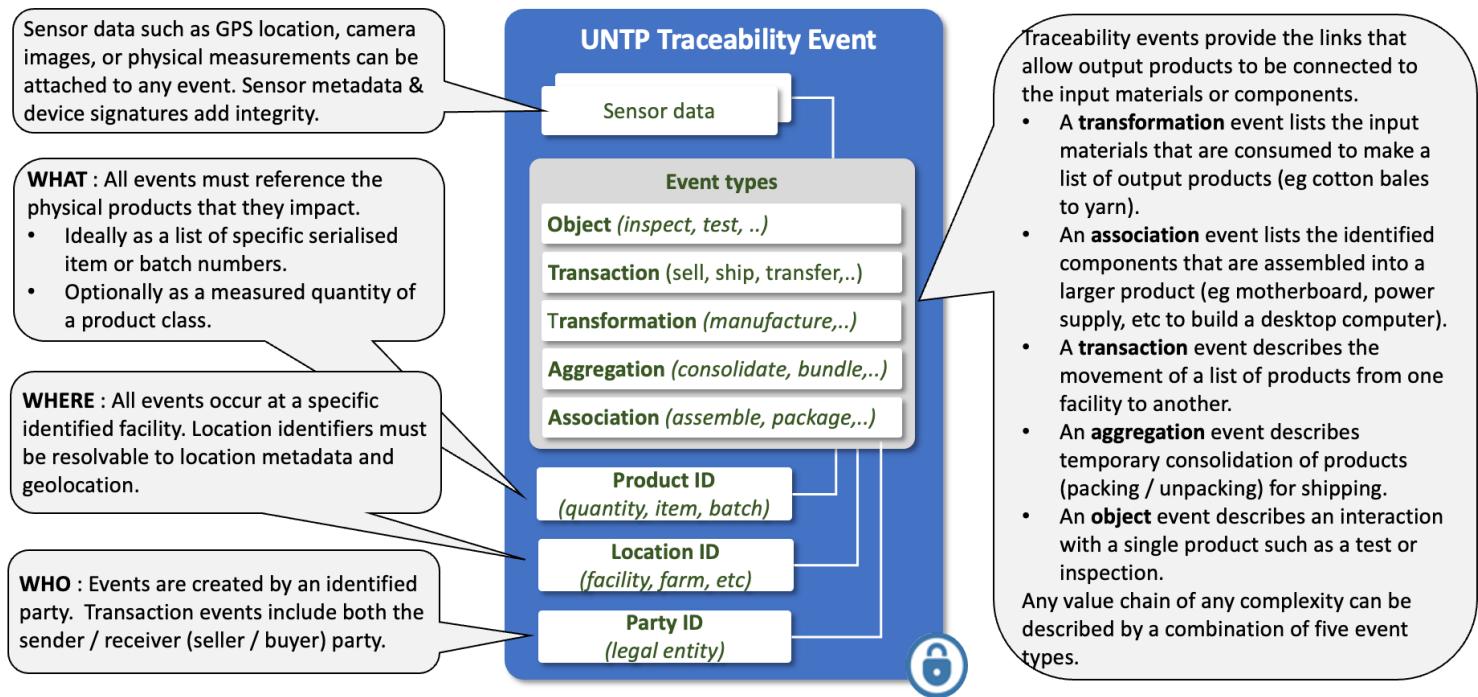
traceability Version	Date	status	JSON-LD Context
0.3.0	20-04-2024	Raw (for review)	Coming soon - fixing a bug

The current version of this specification is v0.3.0

## Overview

Traceability events are very lightweights collections of identifiers that specify the “what, when, where, why and how” of the products and facilities that constitute a value chain. The UNTP is based on the [GS1 EPCIS](#) standard for this purpose because it is an existing and proven mechanism for supply chain traceability. Note that UNTP supports but does not require the use of GS1 identifiers. The basic idea behind the traceability event structure is that any supply chain of any complexity can always be accurately modeled using a combination of four basic event types. An **object** event describes an action on specific product(s) such as an inspection. A **transaction** event describes the exchange of product(s) between two actors such as sale of goods between seller and buyer. An **aggregation** event describes the consolidation or de-consolidation of products such as stacking bales of cotton on a pallet for transportation. An **association** event describes the assembly of sub-components to make a composite product. Finally, a **transformation** event describes a manufacturing process that consumes input product(s) to create new output product(s). The UNTP uses these events in a decentralised architecture as the means to traverse the linked-data “graph” that represents the entire value-chain.

## Conceptual Model



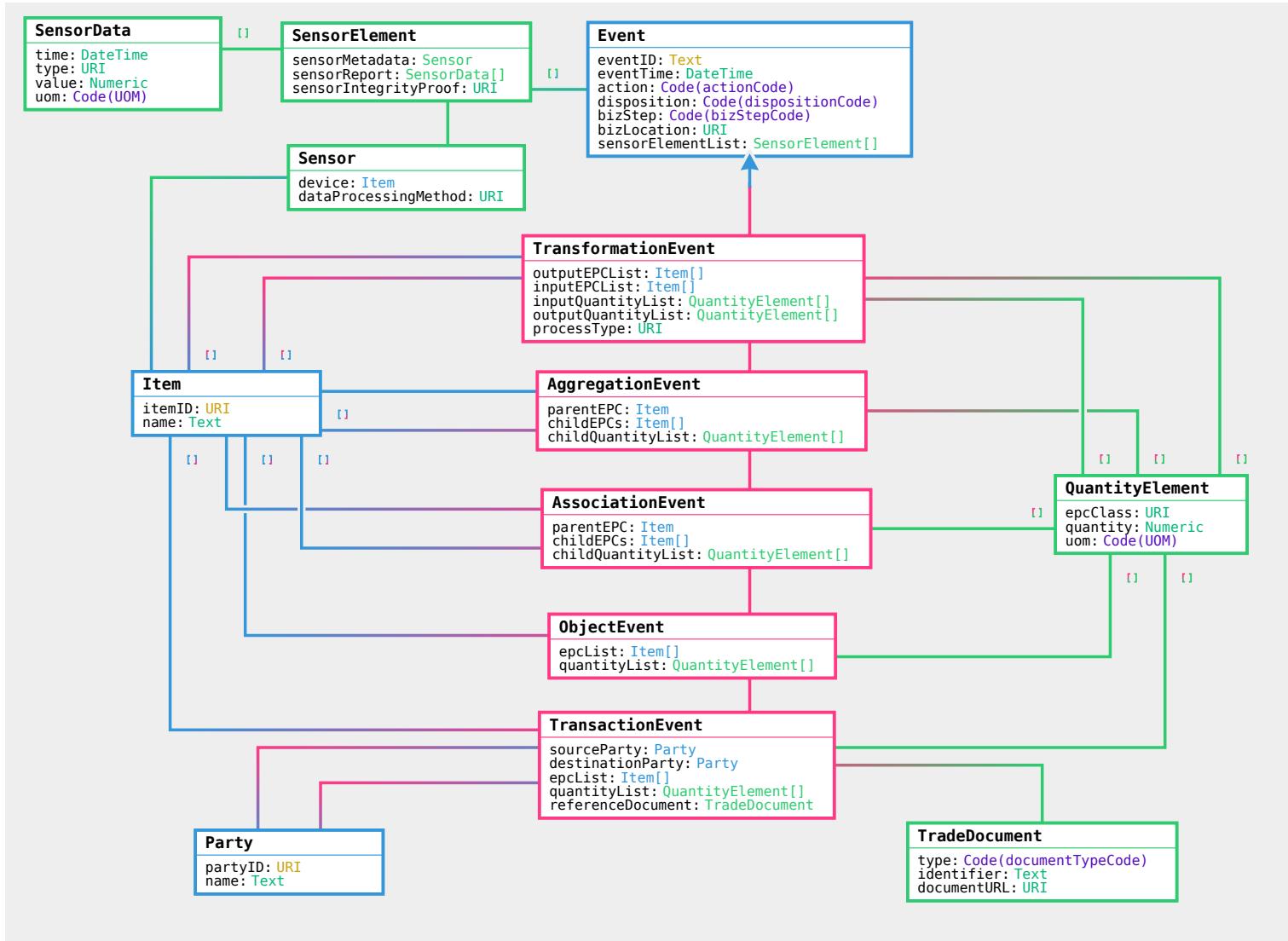
# Requirements

The traceability event is designed to meet the following detailed requirements as well as the more general [UNTP Requirements(<https://unecfact.github.io/spec-untp/docs/about/Requirements>)]

ID	Name	Requirement Statement	Solution Mapping
TEV-01	Sub-components	The traceability event MUST provide a mechanism to trace from a DPP representing a product assembly to the individual DPPs of each sub-assembly component part	Association Event
TEV-02	Consumed materials	The traceability event MUST provide a mechanism to trace a manufactured product DPP back to the DPPs representing batches of input materials that are consumed in manufacturing one or more output products.	Transformation Event] (#transformationevent)
TEV-03	Aggregated bundles	When a DPP represents an aggregated bundle of similar items (eg a pallet of	Aggregation Event

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
		cotton bales) then the traceability event MUST provide a means to allocate the aggregate measures to each individual item (ie each bale)	
TEV-04	Transportation	when a product (or consolidated consignment) is shipped from one physical location to another, the traceability event MUST provide a means to record the movement and associate sustainability measures such as transport emissions to the shipped bundle	Transaction event
TEV-05	items or quantities	Traceability events MUST work equally well whether the input or output items are individually serialised items or measured quantities (mass or volume) of a product class.	Items Quantity
TEV-06	IoT Sensor data	Traceability events will often be generated by or associated with physical sensor readings. In such cases, the traceability event SHOULD support the association of sensor data with the event	Sensor element
TEV-07	Time & Location	Traceability events MUST always record the timestamp and physical location of the event so that multiple events can be connected in time and space	Event

## Logical Model



# Data Definitions

## Event

This abstract event structure provides a common language to describe supply chain events such as shipments, inspections, manufacturing processes, etc. There are four types of event but this is an abstract class representing all common properties of an event.

Property	Definition	Type
eventID	The unique identifier of this event - SHOULD be a UUID	Text
eventTime	The ISO-8601 date time when the event occurred.	DateTime

<b>Property</b>	<b>Definition</b>	<b>Type</b>
action	Code describing how an event relates to the life-cycle of the entity being described.	Code (actionCode)
disposition	Disposition code describing the state of the item after the event.	Code (dispositionCode)
bizStep	A business step code drawn from a controlled vocabulary.	Code (bizStepCode)
bizLocation	A Business Location is a uniquely identified and discretely recorded geospatial location that is meant to designate the specific place where an object is assumed to be following an EPCIS event until it is reported to be at a different Business Location by a subsequent EPCIS event. The bizLocation must be a resolvable URI that links to facility information and geolocation data.	URI
sensorElementList	An array (one for each sensor) of sensor device data sets associated with the event.	SensorElement

## Object Event

Object represents an event that happened to one or more physical or digital objects - such as an inspection or certification of a product or shipment. The physical objects may be identified either as specific items (eg a unique consignment number) or as a quantified amount of a product class (eg 100Kg of cotton yarn)

Note that object event includes all the properties of [Event](#) as well as the additional properties described below.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
epcList	A list of uniquely identified items (eg specific items serial numbers or tagged shipments / packages) that are the focus of	Item

<b>Property</b>	<b>Definition</b>	<b>Type</b>
	this object event.	
quantityList	A quantified list of product classes (eg GS1 GTINs) that are the focus of this object event	QuantityElement

## Aggregation Event

Aggregation represents an event that happened to one or more objects that are physically aggregated together (physically constrained to be in the same place at the same time, as when cases are aggregated to a pallet). This event is also used to represent de-aggregation (eg unpacking) when businessStepCode is unpacking.

Note that aggregation event includes all the properties of [Event](#) as well as the additional properties described below.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
parentEPC	The unique item identifier that is the result of this aggregation. Typically a packaging ID used in shipments that represents a box/ pallet / container of contained items.	Item
childEPCs	The list of child items that have been aggregated into the parent (or dis-aggregated from the parent). Maybe a list of package references (eg boxes on a pallet) or may be individual items (eg products in a box).	Item
childQuantityList	List of quantified product classes that have been aggregated into the parent. Used when the child items do not have unique identifiers (eg 100 Kg of cotton bales)	QuantityElement

## Transaction Event

Transaction represents an event in which one or more objects become associated or disassociated with one or more identified business transactions - such as the purchase /

shipment of goods between buyer and seller.

Note that transaction event includes all the properties of [Event](#) as well as the additional properties described below.

Property	Definition	Type
sourceParty	The source party for this supply chain transaction - typically the seller party	Party
destinationParty	The destination party for this supply chain transaction - typically the buyer party.	Party
epcList	The list of uniquely identified trade items included in this supply chain transaction.	Item
quantityList	List of quantified product classes that are included in this transaction. Used when the trade items do not have unique identifiers (eg 100 reels of yarn)	QuantityElement
referenceDocument	The supply chain document reference for this transaction event - eg the invoice, order, or dispatch advice	TradeDocument

## Transformation Event

Transformation represents an event in which input objects are fully or partially consumed and output objects are produced, such that any of the input objects may have contributed to all of the output objects - for example consuming bales of cotton to produce yarn.

Note that transformation event includes all the properties of [Event](#) as well as the additional properties described below.

Property	Definition	Type
outputEPCList	The list of uniquely identified items that are the output of this transformation event - for example a list of	Item

Property	Definition	Type
	individually identified bolts of cloth that are the output of a weaving process.	
inputEPCList	The list of uniquely identified items that are the input of this transformation event - for example a list of individually identified bobbins of yarn that are the input of a weaving process.	Item
inputQuantityList	The quantified list of product classes that are the input of this transformation event - used when each item does not have a unique identity. for example the weight of raw cotton that is the input to a ginning process.	QuantityElement
outputQuantityList	The quantified list of product classes that are the output of this transformation event - used when each item does not have a unique identity. for example a count of the bales of cleaned cotton that are the output of a ginning process.	QuantityElement
processType	An industry specific process type code.	URI

## AssociationEvent

The association event represents the assembly of child sub-components to create a parent assembled item. For example a desktop computer assembled from power supply, hard drive, and motherboard. The association event is very similar in structure to the aggregation event but is used for physical assembly. An association event may represent a bill of materials used to assemble a product whilst an aggregation event may represent a packing list or items for transport.

Note that association event includes all the properties of [Event](#) as well as the additional properties described below.

Property	Definition	Type
parentEPC	The unique item identifier that is the parent of this association. Typically an assembled product ID such as a desktop computer that is built from the associated child components.	Item
childEPCs	The list of child items that have been assembled to create the parent - for example the power supply or hard drive components of a desktop computer.	Item
childQuantityList	List of quantified product classes that have been assembled into the parent. Used when the child items do not have unique identifiers (eg brackets and screws used in the assembly of a desktop computer)	QuantityElement

## QuantityElement

The quantity element is used to define the quantities (eg 100), units of measure (eg Kg) and product class (eg GTIN or other class identifier) of products that are inputs or outputs or the subject of supply chain events.

Property	Definition	Type
epcClass	THe identifier of a product class (as opposed to a product instance) such as a GTIN code for a manufactured product.	URI
quantity	The numeric quantity of the product class (eg 100 kg of cotton)	Numeric
uom	The unit of measure for the quantity value (eg Kg or meters etc) using the UNECE Rec 20 unit of measure codelist.	Code (UOM)

## TradeDocument

A trade transaction between two parties such as an invoice, purchase order, or shipping notification.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
type	The document type representing the trade transaction drawn from the business transaction type vocabulary.	Code (documentTypeCode)
identifier	The identifier of the trade transaction document - eg an invoice number or bill of lading number. Must be unique for a given source party	Text
documentURL	The URL of the referenced trade document. For integrity reasons, it is recommended (but not required) that the documentURL is a hash-link ( <a href="https://w3c-cdg.github.io/hashlink/">https://w3c-cdg.github.io/hashlink/</a> ) so that if the document the URL is changed then the hash verification will fail.	

## Item

A specific trade item /product code which could be either a product serial number or a consignment identifier

<b>Property</b>	<b>Definition</b>	<b>Type</b>
itemID	The globally unique identifier (eg GS1 GTIN or digital link) of the product item.	URI
name	The name of the product class to which the product item belongs.	Text

## Party

A trade party

<b>Property</b>	<b>Definition</b>	<b>Type</b>
partyID	The globally unique identifier of the party. This must be expressed as a URI that is (preferably) resolvable to an entity register such as a national business register - eg <a href="https://abr.business.gov.au/ABN/View?abn=41161080146">https://abr.business.gov.au/ABN/View?abn=41161080146</a>	URI

<b>Property</b>	<b>Definition</b>	<b>Type</b>
name	The entity name of the identified party - usually the business name from the corresponding national registry -eg ACME LTD	Text

## SensorElement

A SensorElement is used to carry data related to an event that is captured one sensor such as an IoT device. Include one sensor property and an array of sensor data values.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
sensorMetadata	Data that describes the physical sensor that recorded the sensor data set.	Sensor
sensorReport	A list of sensor readings from the given sensor relevant to the traceability event context.	SensorData
sensorIntegrityProof	An optional reference to a verifiable credential signed by the sensor device or device manufacturer that contains the digitally signed raw data associated with this sensor report.	URI

## Sensor

A physical sensor that records a sensor data set.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
device	The device Identifier for the sensor as a URI (typically an EPC)	Item
dataProcessingMethod	The data processing method used by the sensor - should reference a documented standard criteria as a URI	URI

## SensorData

A data point read by a sensor.

<b>Property</b>	<b>Definition</b>	<b>Type</b>
time	the timestamp at which the sensor reading was made.	DateTime
type	the measurement type of the sensor reading, as a URI reference to a measurement method specification.	URI
value	the sensor reading	Numeric
uom	the unit of measure for the sensor reading	Code (UOM)

## Code Tables

### actionCode

The Action type says how an event relates to the lifecycle of the entity being described. For example, AggregationEvent is used to capture events related to aggregations of objects, such as cases aggregated to a pallet. Throughout its life, the pallet load participates in many business process steps, each of which may generate an EPCIS event. The action field of each event says how the aggregation itself has changed during the event: have objects been added to the aggregation, have objects been removed from the aggregation, or has the aggregation simply been observed without change to its membership? The action is independent of the bizStep (of type BusinessStepID) which identifies the specific business process step in which the action took place.

<b>Name</b>	<b>Description</b>
observe	The entity in question has not been changed.
add	The entity in question has been created or added to.
delete	The entity in question has been removed from or destroyed altogether.

### dispositionCode

Disposition code is a vocabulary whose elements denote a business state of an object. An example is a code that denotes “recalled”. The disposition field of an event specifies the business condition of the event’s objects, subsequent to the event. The disposition is assumed to hold true until another event indicates a change of disposition. Intervening events that do not specify a disposition field have no effect on the presumed disposition of the object.

Code values for this table can be found here:  
<https://ref.gs1.org/cbv/Disp>

## bizStepCode

BusinessStep is a vocabulary whose elements denote steps in business processes. An example is an identifier that denotes “shipping.” The business step field of an event specifies the business context of an event: what business process step was taking place that caused the event to be captured?

Code values for this table can be found here:  
<https://ref.gs1.org/cbv/BizStep>

## UOM

UNECE Recommendation 20 Unit of Measure code list.

Code values for this table can be found here:  
<https://vocabulary.uncefact.org/UnitMeasureCode>

## documentTypeCode

Document type codes for trade and logistics documents supporting the event such as purchase order, invoice, shipping notification, bill of lading, etc.

Code values for this table can be found here:  
<https://ref.gs1.org/cbv/BTT>

## Samples

## Object Event

```
{  
  "epcList": [  
    {  
      "itemID": "http://example.com",  
      "name": "string"  
    }  
  ],  
  "quantityList": [  
    {  
      "epcClass": "http://example.com",  
      "quantity": 0,  
      "uom": "string"  
    }  
  ],  
  "eventTime": "2019-08-24T14:15:22Z",  
  "action": "observe",  
  "disposition": "string",  
  "bizStep": "string",  
  "bizLocation": "http://example.com",  
  "sensorElementList": [  
    {  
      "sensorMetadata": {  
        "device": {  
          "itemID": "http://example.com",  
          "name": "string"  
        },  
        "dataProcessingMethod": "http://example.com"  
      },  
      "sensorReport": [  
        {  
          "time": "2019-08-24T14:15:22Z",  
          "type": "http://example.com",  
          "value": 0,  
          "uom": "string"  
        }  
      ],  
      "sensorIntegrityProof": "http://example.com"  
    }  
  ]  
}
```

## Transaction Event

Note that the sensorElementList property exists in the transaction event but is not expanded in the sample below for brevity purposes.

```
{  
  "sourceParty": {  
    "partyID": "http://example.com",  
    "name": "string"  
  },  
  "destinationParty": {  
    "partyID": "http://example.com",  
    "name": "string"  
  },  
  "epcList": [  
    {  
      "itemID": "http://example.com",  
      "name": "string"  
    }  
  ],  
  "quantityList": [  
    {  
      "epcClass": "http://example.com",  
      "quantity": 0,  
      "uom": "string"  
    }  
  ],  
  "referenceDocument": {  
    "type": "string",  
    "identifier": "string",  
    "documentURL": "http://example.com"  
  },  
  "eventTime": "2019-08-24T14:15:22Z",  
  "action": "observe",  
  "disposition": "string",  
  "bizStep": "string",  
  "bizLocation": "http://example.com",  
  "sensorElementList": [...]  
}
```

## Aggregation Event

Note that the sensorElementList property exists in the transaction event but is not expanded in the sample below for brevity purposes.

```
{
  "parentEPC": {
    "itemID": "http://example.com",
    "name": "string"
  },
  "childEPCs": [
    {
      "itemID": "http://example.com",
      "name": "string"
    }
  ],
  "childQuantityList": [
    {
      "epcClass": "http://example.com",
      "quantity": 0,
      "uom": "string"
    }
  ],
  "eventTime": "2019-08-24T14:15:22Z",
  "action": "observe",
  "disposition": "string",
  "bizStep": "string",
  "bizLocation": "http://example.com",
  "sensorElementList": [...]
}
```

## Transformation Event

Note that the sensorElementList property exists in the transaction event but is not expanded in the sample below for brevity purposes.

```
{
  "outputEPCList": [
    {
      "itemID": "http://example.com",
      "name": "string"
    }
  ],
  "inputEPCList": [
    {
      "itemID": "http://example.com",
      "name": "string"
    }
  ],
  "inputQuantityList": [
```

```
{
  "epcClass": "http://example.com",
  "quantity": 0,
  "uom": "string"
},
],
"outputQuantityList": [
  {
    "epcClass": "http://example.com",
    "quantity": 0,
    "uom": "string"
  }
],
"processType": "http://example.com",
"eventTime": "2019-08-24T14:15:22Z",
"action": "observe",
"disposition": "string",
"bizStep": "string",
"bizLocation": "http://example.com",
"sensorElementList": [...]
}
```

## Association Event

Note that the sensorElementList property exists in the transaction event but is not expanded in the sample below for brevity purposes.

```
{
  "parentEPC": {
    "itemID": "http://example.com",
    "name": "string"
  },
  "childEPCs": [
    {
      "itemID": "http://example.com",
      "name": "string"
    }
  ],
  "childQuantityList": [
    {
      "epcClass": "http://example.com",
      "quantity": 0,
      "uom": "string"
    }
  ],
}
```

```
"eventTime": "2019-08-24T14:15:22Z",
"action": "observe",
"disposition": "string",
"bizStep": "string",
"bizLocation": "http://example.com",
"sensorElementList": [ .. ]
}
```

## Working Examples

TBC

# Identifiers

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

Identifiers of **businesses** (eg tax registration numbers), of **locations** (eg google pins or cadastral/lot numbers), and of **products** (eg GS1 GTINs or other schemes) are ubiquitous throughout supply chains and underpin the integrity of the system. UNTP builds upon existing identifier schemes without precluding the use of new schemes so that existing investments and high integrity registers can be leveraged. UNTP requires four key features of the identifiers and, for those that don't already embody these features, provides a framework to uplift the identifier scheme to meet UNTP requirements. Identifiers used in UNTP implementations should be **discoverable** (ie easily read by scanning a barcode, QR code, or RFID), **globally unique** (ie by adding a domain prefix to local schemes), **resolvable** (ie given an identifier, there is a standard way to find more data about the identified thing), and **verifiable** (ie ownership of the identifier can be verified so that actors cannot make claims about identifiers they don't own).

## Discoverability

The term 'data carrier' applies to all 1- and 2-dimensional barcode symbols and radio frequency tags. A very large number of data carriers are in use, including proprietary ones tied to specific apps. For UNTP, the important data carriers are those defined by [ISO/IEC Joint Technical Committee 1, Steering Committee 31](#). These include different types of linear symbol most people think of as 'a barcode', as well as [Data Matrix](#), [QR Code](#) and RFID tags. The standards for those data carriers do not define the type of identifier(s) that can be encoded so that, for practical purposes, it's necessary to also consider the origin and management of the identifiers to be encoded, the syntax to be used for that encoding, the devices and software necessary to print and read the data. It is this multi-layered complexity that makes "Automatic Identification and Data Capture" (AIDC) a professional activity in its own right.

Given this background, 'discoverability' itself has several aspects. It is reasonable to assume that someone inspecting goods in the course of their work will be equipped with a specialist device. This is

always necessary for RFID tags, the principal advantage of which is that hundreds, if not thousands, of tags can be scanned within a given volume, even without line of sight. But be aware that the device needs to be running software that can interpret the data it receives. Handheld optical scanners are also in common use and these will typically be able to read a very wide variety of optical symbols. But again, the key question is whether or not the software can interpret the data read from the carrier.

It hardly needs saying that the more standardized the identifiers and the encoding used, the more widely used the data carrier, and the more ubiquitous the software used to interpret the data read from the carrier, the more interoperable and therefore the more discoverable the identifiers will be. It is this kind of consideration that often leads industry to choose established identifier and data exchange systems such as that offered by GS1. That said, modern smartphones can read any almost any optical barcode and NFC tag *if* the user first opens an app that can interpret the data. This is true for proprietary data carriers and identifiers as well as standardized ones. Installing an app can readily turn a general-purpose smartphone into a specialist device. This opens up the option of using less-established identifier schemes and syntaxes including Decentralized Identifiers (DIDs). Then it's a question of whether the identifiers are equally discoverable at different points along the supply chain.

One case deserves special mention: a URL encoded in a QR Code. Almost all smartphone users can scan a QR Code just using the native camera app and, if the QR Code contains a URL, the Web browser will open the relevant Web page. This kind of identifier is therefore the most discoverable of all. That is, if a URL in the QR code is treated as the identifier then discoverability is a given. However, using a URL itself as the identifier brings some issues of its own. For example, over the medium to long term, many URLs suffer 'link rot' - that is, the URL no longer functions. Or if it does, it may lead to a Web page very different from the one originally intended. Furthermore, existing data exchange systems are likely to be built on short offline identifiers. ISO/IEC 18975 (currently a Draft International Standard) attempts to offer the best of both worlds by providing a means to encode existing identifiers into a data structure that is also a URL. Non-specialist software - notably a smartphone's camera app - can just read it like any URL. But specialist software can parse the URL to extract the identifiers used to identify products, batches and more.

## Global Uniqueness

## Resolvability

# Vocabularies

## !(INFO)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

Web **vocabularies** are a means to bring consistent understanding of **meaning** to ESG claims and assessments throughout transparent value chains based on UNTP. There are hundreds of ESG standards and regulations around the world, each with dozens or hundreds of specific conformity **criteria**. Any given value chain from raw materials to finished product is likely to include dozens of passports and conformity credentials issued against any of thousands of ESG criteria. Without a consistent means to make sense of this data, UNTP would provide a means to discover a lot of data but no easy way to make sense of it. The UNTP defines a standard and extensible topic map (taxonomy) of ESG criteria and provides a mechanism for any standards authority, or national regulator, or industry association to map their specific terminology to the UNTP vocabulary.

## UN ESG Topic Map

## ESG Standards Criteria

# Verifiable Credentials

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

The World-Wide-Web Consortium (W3C) has defined a standard called [Verifiable Credentials \(VCs\)](#). A VC is a portable digital version of everyday credentials like education certificates, permits, licenses, registrations, and so on. VCs are digitally signed by the issuing party and are tamper proof, privacy preserving, revocable, and digitally verifiable. The UN has previously assessed this standard and has recommended its use for a variety of cross border trade use cases in a recent [white paper](#). VCs are inherently decentralized and so are an excellent fit for UNTP which recommends that passports, credentials, and traceability events are all issued as W3C VCs. A related W3C standard called [Decentralized Identifiers \(DIDs\)](#) provides a mechanism to manage the cryptographic keys used by verifiable credentials and also to link multiple credentials into verifiable trust graphs. DIDs are not the same as the business / product / location identifiers maintained by authoritative agencies - but can be linked to them.

## Business requirements for UNTP application of VCs

Verifiable Credentials technology is one of the key tools in the UNTP anti-green-washing toolbox. But there are many different technical implementation options which presents an interoperability risk - namely that credentials issued by one party will not be understandable or verifiable by another party. UNTP will not design new technical standards as that is the role of technology standards bodies such as W3C or IETF. However, by recommending the use of the narrowest practical set of technical options for a given business requirement, the UNTP can enhance interoperability.

A key design principle that is applicable to decentralized ecosystems such as UNTP recommends is [Postel's robustness principle](#) which, for UNTP, means that **an implementation should be conservative in its sending (issuing) behavior, and liberal in its receiving (verifying) behavior**. That is because the sustainability evidence that is discovered in any given value chain may be presented as many different versions of W3C VCs, or ISO mDL credentials, or Hyperledger Anoncreds,

or as human readable PDF documents. Being as open as possible in what is received and verified will allow sustainability assessments to be made over a wide set of evidence. Conversely, choosing a narrow set of ubiquitous technology options when issuing UNTP credentials such as digital product passports will simplify the task of verifiers and minimise costs for the entire ecosystem.

<b>ID</b>	<b>Name</b>	<b>Requirement Statement</b>	<b>Solution Mapping</b>
VC-01	Integrity	VC technology recommendations must support tamper detection, issuer identity verification, and credential revocation so that verifiers can be confident of the integrity of UNTP credentials.	All VC options support this requirement
VC-02	Compatibility	VC technology recommendations for issuing UNTP credentials should be as narrow as practical and should align with the most ubiquitous global technology choices so that technical interoperability is achieved with minimal cost	Basic profile
VC-03	Human readable	VC technology recommendations must support both human readable and machine readable credentials so that uptake in the supply chain is not blocked by actors with lower technical maturity.	Render method
VC-04	Discovery	VC technology recommendations must support the discovery and verification of credentials from product identifiers so that verifiers need not have any a-priori knowledge of or relationship to either the issuers or the subjects of credentials.	Presentations
VC-05	Semantics	VC technology recommendations must support the use of standard web vocabularies so that data from multiple independent credentials can be meaningfully aggregated.	Vocabularies
VC-06	Performance	VC technology recommendations should value performance so that graphs containing hundreds of	Basic profile

ID	Name	Requirement Statement	Solution Mapping
		credentials of any size can be traversed and verified efficiently.	
VC-07	Compliance	VC technology recommendations must meet any technology based regulatory requirements that apply in the countries in which credentials are issued or verified.	Basic profile
VC-08	Openness	VC DID method recommendations must not drive users towards closed ecosystems or proprietary ledgers so that there is no network effect coercion towards proprietary ledgers.	DID methods
VC-09	Portability	VC DID method recommendations must allow users (issuers) to move their DID documents between different service providers so that long duration credentials can remain verifiable even when issuers change service providers.	DID methods
VC-10	Evolution	VC technology is evolving and UNTP recommendations must evolve as newer tools and versions become ubiquitous	Roadmap

## VC basic profile

The VC basic profile is designed to be as simple, lightweight, and interoperable as possible. A conformant implementation

- MUST implement the [W3C VC Data Model v1.1](#) using the JSON-LD Compacted Document Form
- SHOULD implement the [W3C VC Data Model v2.0](#) using the JSON-LD Compacted Document Form
- MUST implement [W3C VC Bitstring Status List](#) for credential status checks including revocation checks
- MUST implement [W3C-DID-CORE](#) using DID methods defined in [DID methods](#)
- MUST implement the enveloping proof mechanism defined in [W3C VC JOSE / COSE](#) with JOSE (Section 3.1.1)

- SHOULD implement the embedded proof mechanism defined in [W3 Data Integrity proof](#)

## DID methods

There are a large number of did methods listed in the [W3C did register](#). It is reasonable to expect that this proliferation of did methods will consolidate to a much smaller number of did methods, each designed to meet a specific business need. In future the UNTP may provide a did method decision tree with different methods for different use cases (eg legal entities vs products). In the meantime, a conformant implementation

- MUST implement the [did:web method](#) as an Organizational Identifiers
- SHOULD implement the did:web method using the web domain of the issuer to avoid portability challenges.

Note that there is activity within the VC technical community to define new did methods that achieve the ubiquity of did:web whilst still maintaining portability across web domains. This work may impact UNTP did method recommendations.

## Render Method

To support uptake across supply chain actors with varying levels of technical maturity, human rendering of digital credentials is essential. A conformant implementation

- MUST implement the [VC HTML Rendering Method](#) using a hash-linked external rendering template.
- MAY implement other rendering methods (eg SVG or PDF)

Note that there is a pending update to the [rendering specification](#) to support HTML rendering and hash-links.

## Presentations

Verifiable Presentations (VP) are widely used in the verifiable credentials ecosystem to support holders to combine one or more credentials in a digital wallet and then present them for in-person or online verification purposes. The VP is signed by the holder did and so provides a holder binding mechanism. In UNTP supply chain implementations, the subject of most claims is an inanimate object (eg bar-coded goods) and digital credentials about the goods are discovered by any party that has access to the goods. The box of goods does not create verifiable presentations on demand and the binding is to the identity of the goods. A conformant UNTP implementation

- MUST issue and publish product passports, product conformity credentials, and traceability events as verifiable credentials and MUST include the identifier of the goods within the VC subject.
- MAY exchange these and any other credentials as verifiable presentations in wallet-to-wallet transfers or any other method.

## Vocabularies

A shared understanding of the meaning of claims made in verifiable credentials is essential to interoperability. To this end, conformant UNTP implementations

- MUST use the [JSON-LD](#) syntax for the representation of data in all issued credentials.
- MUST implement the UN/CEFACT web vocabulary](<https://vocabulary.uncefact.org/>) JSON-LD @context and schema for Digital Product Passports, Conformity Credentials, traceability events, and identity credentials.
- SHOULD implement widely used industry vocabularies such as [schema.org](#) or [GS1](#) web vocabulary as a first choice for UNTP extensions requiring terms not in the UN vocabulary.
- MAY use any other published JSON-LD vocabulary for any other industry or country specific extensions.

## Roadmap

Future versions of this specification will

- Provide richer guidance on did methods via a decision tree that helps to select the right method for the right purpose
- Provide guidance on selective redaction methods to better support confidentiality goals.
- Provide timelines for transition between versions of technical specifications (eg when VCDM 2.0 will change from SHOULD support to MUST support)

# Data Carriers

## !(INFO)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

Digital data needs to be linked to the physical product it describes and should be discoverable through the identifiers printed on that product, including serial or batch number as appropriate. For high volume goods and easy / reliable discovery, these identifiers are already typically represented as barcodes, matrix codes, QR codes, or RFID encoded data. UNTP supports the use of these existing data carriers. A basic UNTP principle is that if you have a product then you should be able to find ESG data about that product even when the identifier is not a web link. Therefore, the UNTP defines a generalised protocol (based on [ISO/IEC DIS 18975](#)) to allow any identifier scheme (GS1 or otherwise) to be consistently resolvable so that product passports and other data can always be accessed from the identifier of the product. The UNTP also defines a specific QR based data carrier format for use on paper/PDF versions of conformity credentials or other trade documents that provides secure access to credentials in a way that is both human and machine readable. This provides a simple but powerful mechanism to facilitate uptake of digital solutions alongside existing paper/PDF based frameworks.

## Resolvers

A *resolver* is a service that connects an identifier to one or more sources of information about the identified thing. An internet domain name *resolves* to one or more actual servers (identified by their IP addresses). Digital Object Identifiers ([DOIs](#)), commonly used to identify research papers, *resolve* to the paper itself (wherever it may be). In the UNTP context, identifiers for products, locations and supply chain operators must resolve to information about those entities. This can include the DPP, ESG certificates and more, some of which may be access-controlled. That is, knowing the location of information is not the same as automatically having access to it.

[ISO/IEC DIS 18975](#) specifies two different approaches for encoding identifiers in HTTP URIs (web addresses). Either can be used to point to a resolver that associates an identifier with a set of links to one or more sources of relevant information following the IETF's Linkset standard [RFC9264](#). A

conformant resolver can respond to queries for a particular type of information about the identified entity by providing the appropriate link from the linkset. GS1 Digital Link is conformant to this model. The [URI syntax](#) follows the *structured path* approach set out in ISO/IEC DIS 18975 and the [GS1-Conformant resolver](#) standard defines the related service. An example will make this clearer:

Imagine a white t-shirt that has a GTIN of 9506000164908. This can be encoded in a GS1 Digital Link URI as <https://id.gs1.org/01/09506000164908>, which can, in turn, be encoded in a QR Code. Following that link, without any specialist software, will take you to a landing page for the white t-shirt from which there are links to specific types of information. One of those links is to sustainability information. Using an app, it's possible to ask the resolver directly for that sustainability information by appending the GS1 Digital Link URI with an instruction thus: <https://id.gs1.org/01/09506000164908?linkType=gs1:sustainabilityInfo>. The resolver recognises the `linkType` parameter and redirects immediately to that page. Alternatively, software can [request the full linkset](#) and either present it to the user or process it as it sees fit. See the next section for more on link types.

## Link Vocabulary

With very few exceptions, all websites include hyperlinks to different pages within those websites. Users understand that clicking a 'menu' option will take them to that kind of information. Online newspapers provide a good example. There will typically be a home news section, foreign news, economics, sport, arts, lifestyle, weather, TV guide and so on. Applying this to UNTP, when looking for information about a product the user will want the DPP, certificates covering ESG issues and conformance, perhaps manufacturer's details. These can all be provided using the same infrastructure and methods as used for consumer information such as the sustainability page in the white t-shirt example above.

The IETF's [RFC9264](#) defines how sets of links can be made machine-discoverable and machine-interpretable. The key feature being that each link is annotated with the type of thing it points to. There is no limit on those link types but interoperability is lost if everyone uses their own. Therefore it is preferable to choose link types from a defined list that is under formal change management. GS1 provides [one such list](#) as part of its Web Vocabulary.

## 1D Barcodes

## 2d Matrix Codes

**QR Codes**

**RFID Codes**

# Best Practices

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

Design patterns are non-normative but provide best practice guidance for UNTP implementers.

## Trust Anchors

UNTP credentials will include identifiers of products, locations or businesses. UNTP credentials will also include ESG performance claims like emissions intensity values. But how can a verifier of these identifiers or ESG claims be confident that the claims are true and that they are made by the genuine party at a verifiable location? Trust anchors are national or international authorities that typically run existing business or product registration, certification, accreditation, or other high integrity processes. Examples of trust anchors include national regulators that govern things like land ownership or business registrations. Another example are the national accreditation bodies that audit and accredit certifiers to issue third party assessments. UNTP depends on trust anchors to add digital integrity to ESG claims and identities by linking them to the authority under which they are made. In essence, UNTP defines a protocol for existing trust anchors to continue doing what they have always done, but in a digitally verifiable way.

## Trust Graphs

The ESG footprint of a finished product is the aggregation of its components and processes through the value chain. Verification of ESG claims therefore involves assessing a bundle of linked credentials (aka a "trust graph") drawn from all or part of a value chain. Whilst each credential may be valid in its own right, one challenge is verifying the context of related credentials. For example, a conformity assessment body that is accredited to test strength of structured steel might not be accredited to issue emissions intensity certificates. A technically valid emissions certificate linked to a technically valid accreditation certificate that has a different scope would be fraudulent. To address this problem, the UNTP defines a simple method to verify the contextual scope of linked credentials. Essentially this provides a mechanism to verify a linked graph of data at a layer above individual credential verification.

# **Confidentiality**

There is a balance between the demands of transparency (more supply chain visibility means it's harder to hide greenwashing) and confidentiality (share too much data and you risk exposing commercial secrets). A key UNTP principle is that every supply chain actor should be able to choose their own balance between transparency and confidentiality. To achieve this, UNTP defines six data confidentiality patterns with different degrees of data protection so that they can be appropriately combined to meet the confidentiality goals of each party. This includes the ability to selectively redact data from credentials received from upstream suppliers before passing them on to downstream buyers - without affecting the cryptographic integrity of the data.

# **Counterfeiting**

As the value of genuinely sustainable goods increases, so do the incentives to sell fake goods as the real thing. UNTP defines a simple and decentralised anti-counterfeiting protocol that can be implemented by any producer at very low cost. It builds upon the W3C DID standard by issuing a unique DID (and corresponding keypair) for every serialised (individual or batch) product. The DID (and therefore the public key) is discoverable from the product serial number using the standard link resolver protocol. The item/batch level DID is cryptographically linked to the product class level DID. The private key is discoverable from a QR code hidden inside the product packaging. Scanning the QR provides the necessary key to update the individual serialised product public status to indicate consumption. Attackers that copy genuine serial numbers will find that their products are quickly identifiable as fakes. Attackers that try to create new serial numbers will not be able to create valid links to the genuine product class. The UNTP anti-counterfeiting protocol provides additional value/incentive for UNTP uptake beyond ESG integrity.

# **Mass Balance**

Mass balance fraud is a particularly challenging greenwashing vector. It happens when a fraudulent actor buys a small quantity of high ESG integrity inputs (eg genuine carbon neutral, organic, deforestation free cotton) and mixes that input with lower quality alternatives and then sells the full volume of manufactures product (eg woven cotton fabric) as sustainable product, re-using the valid credentials from the niche supply. The UNTP solution to this problem involves trusted third parties (certifiers or industry associations) to act as quota managers that issue "guarantee of origin" credentials (a type of conformity credential). In this model, the guarantee of origin certificate for 10 Tons of cotton fabric (for example) can only be issued when the third party has evidence of the

purchase of at least 10 Tons sustainable input materials. The third party will also mark the input batch as consumed (in a similar way to the anti-counterfeiting protocol) so that the valid sustainable input cannot be re-presented to a different third party.

## **ESG Rules**

Yet another greenwashing attack vector is to deliberately apply incorrect rules to the determination of criteria such as emissions intensity. The verification question in this case is "yes, but how do I know you calculated it right?". The UNTP proposes an independent calculator service offered either by the standards body or regulator that defined the rules or by an accredited service provider. The Supply chain actor presents raw data to the calculator which returns with a signed credential confirming that the rules were correctly applied. This protocol has an additional benefit for legitimate actors if widely adopted by rules authorities - which is to significantly simplify the assessment of compliance against multiple different rules. By separating observed facts from the assessment of those facts against specific rules then it becomes relatively simple to test compliance against multiple standards and regulations.

## **GS1 Binding**

The UNTP is agnostic of any technology or any identifier system. Nevertheless, GS1 is by far the most widely used scheme for product identification, particularly at the downstream / consumer end of the value chain. Billions of unique product/shipment identifiers have been issued and over 5 billion product barcode scans happen around the world every day. UNTP does not require any actor to adopt GS1 standards and identifiers, but it certainly must facilitate existing GS1 users to adopt the UNTP. To this end, the UNTP defines a specific binding that shows how existing GS1 users can leverage their existing investments when implementing the UNTP.

# Trust Anchors

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

UNTP credentials will include identifiers of products, locations or businesses. UNTP credentials will also include ESG performance claims like emissions intensity values. But how can a verifier of these identifiers or ESG claims be confident that the claims are true and that they are made by the genuine party at a verifiable location? Trust anchors are national or international authorities that typically run existing business or product registration, certification, accreditation, or other high integrity processes. Examples of trust anchors include national regulators that govern things like land ownership or business registrations. Another example are the national accreditation bodies that audit and accredit certifiers to issue third party assessments. UNTP depends on trust anchors to add digital integrity to ESG claims and identities by linking them to the authority under which they are made. In essence, UNTP defines a protocol for existing trust anchors to continue doing what they have always done, but in a digitally verifiable way.

## VC Representation

## Public Web Representation

## Identity Credentials

## Accreditation Credentials

# Trust Graphs

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

The ESG footprint of a finished product is the aggregation of its components and processes through the value chain. Verification of ESG claims therefore involves assessing a bundle of linked credentials (aka a "trust graph") drawn from all or part of a value chain. Whilst each credential may be valid in its own right, one challenge is verifying the context of related credentials. For example, a conformity assessment body that is accredited to test strength of structured steel might not be accredited to issue emissions intensity certificates. A technically valid emissions certificate linked to a technically valid accreditation certificate that has a different scope would be fraudulent. To address this problem, the UNTP defines a simple method to verify the contextual scope of linked credentials. Essentially this provides a mechanism to verify a linked graph of data at a layer above individual credential verification.

## Trust Graphs

## JSON-LD Representation

## SCHACL Graph verification

# Confidentiality

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

There is a balance between the demands of transparency (more supply chain visibility means it's harder to hide greenwashing) and confidentiality (share too much data and you risk exposing commercial secrets). A key UNTP principle is that every supply chain actor should be able to choose their own balance between transparency and confidentiality. To achieve this, UNTP defines six data confidentiality patterns with different degrees of data protection so that they can be appropriately combined to meet the confidentiality goals of each party. This includes the ability to selectively redact data from credentials received from upstream suppliers before passing them on to downstream buyers - without affecting the cryptographic integrity of the data.

## Discoverable Public Data

## Public Data with GUID key

## Encrypted Data with Shared Key

## Encrypted Data with Requestable Key

## Selective Redaction

## Private Data

# Usage Patterns

# Anti-Counterfeiting

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

As the value of genuinely sustainable goods increases, so do the incentives to sell fake goods as the real thing. UNTP defines a simple and decentralised anti-counterfeiting protocol that can be implemented by any producer at very low cost. It builds upon the W3C DID standard by issuing a unique DID (and corresponding keypair) for every serialised (individual or batch) product. The DID (and therefore the public key) is discoverable from the product serial number using the standard link resolver protocol. The item/batch level DID is cryptographically linked to the product class level DID. The private key is discoverable from a QR code hidden inside the product packaging. Scanning the QR provides the necessary key to update the individual serialised product public status to indicate consumption. Attackers that copy genuine serial numbers will find that their products are quickly identifiable as fakes. Attackers that try to create new serial numbers will not be able to create valid links to the genuine product class. The UNTP anti-counterfeiting protocol provides additional value/incentive for UNTP uptake beyond ESG integrity.

## Product Serial DID

## Product Serial VC

## Brand Trust Root

## Public Verification

# **Private Acquittal**

# Mass Balance

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

Mass balance fraud is a particularly challenging greenwashing vector. It happens when a fraudulent actor buys a small quantity of high ESG integrity inputs (eg genuine carbon neutral, organic, deforestation free cotton) and mixes that input with lower quality alternatives and then sells the full volume of manufactures product (eg woven cotton fabric) as sustainable product, re-using the valid credentials from the niche supply. The UNTP solution to this problem involves trusted third parties (certifiers or industry associations) to act as quota managers that issue "guarantee of origin" credentials (a type of conformity credential). In this model, the guarantee of origin certificate for 10 Tons of cotton fabric (for example) can only be issued when the third party has evidence of the purchase of at least 10 Tons sustainable input materials. The third party will also mark the input batch as consumed (in a similar way to the anti-counterfeiting protocol) so that the valid sustainable input cannot be re-presented to a different third party.

# ESG Rules

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

Yet another greenwashing attack vector is to deliberately apply incorrect rules to the determination of criteria such as emissions intensity. The verification question in this case is "yes, but how do I know you calculated it right?". The UNTP proposes an independent calculator service offered either by the standards body or regulator that defined the rules or by an accredited service provider. The Supply chain actor presents raw data to the calculator which returns with a signed credential confirming that the rules were correctly applied. This protocol has an additional benefit for legitimate actors if widely adopted by rules authorities - which is to significantly simplify the assessment of compliance against multiple different rules. By separating observed facts from the assessment of those facts against specific rules then it becomes relatively simple to test compliance against multiple standards and regulations.

# Business Case

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Business Case

# For Industry

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Industry

# For Certifiers

## !(info)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Certifiers

# For Industry Associations

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## For Industry Associations

# For Regulators

## !(info)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Regulators

# For Software Vendors

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## For Software Vendors

# Implementation Guidance

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Implementation Guidance

# For Industry

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Industry

# For Certifiers

## !(info)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Certifiers

# For Industry Associations

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## For Industry Associations

# For Regulators

## !(info)

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

# For Regulators

# For Software Vendors

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## For Software Vendors

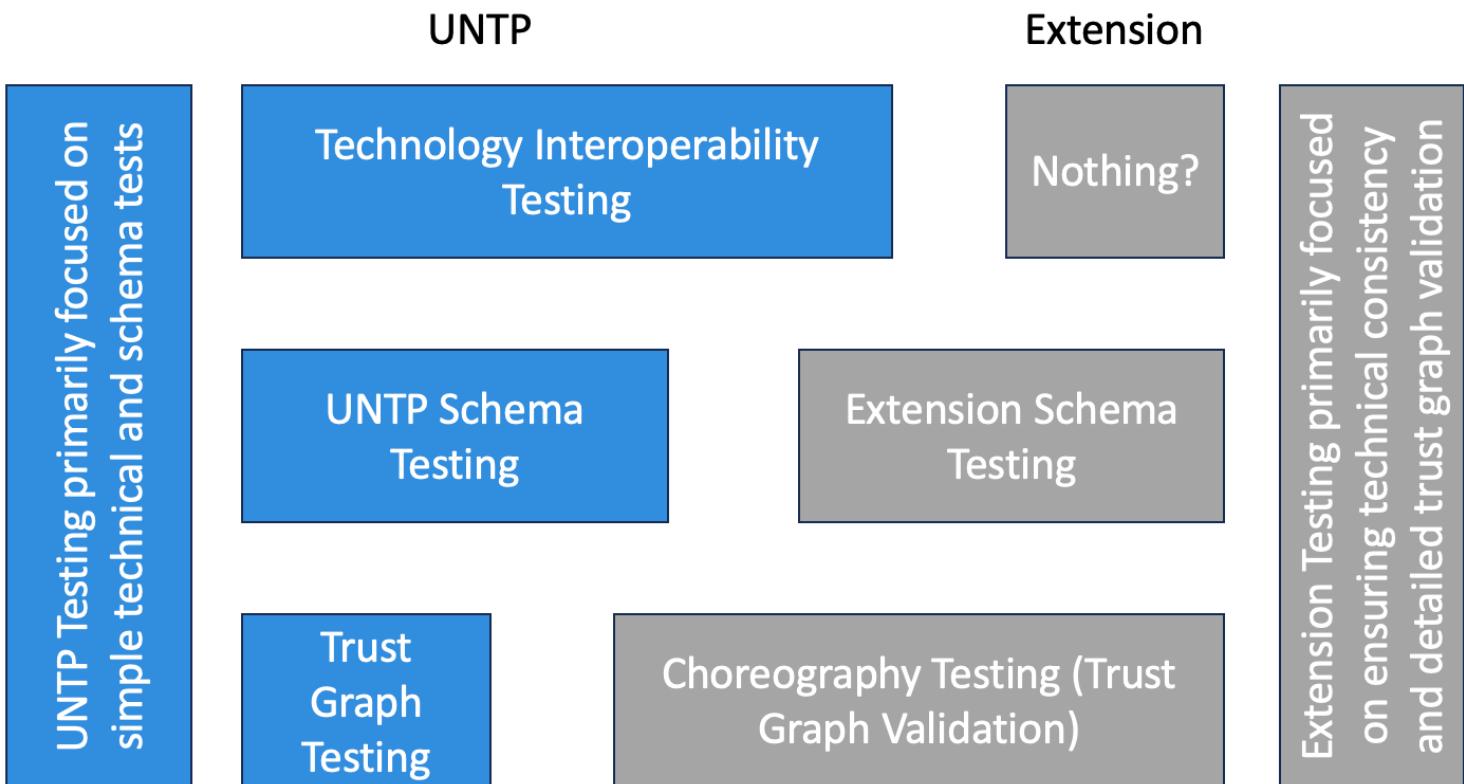
# Test Services

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## 3 Tier Test Architecture

There is a 3 tier testing architecture to help implementors ensure that they are issuing UNTP interoperable digital product passports. This architecture also ensures that as implementors 'extend' the UN Transparency Protocol they do that in a non-breaking fashion.



At each tier we articulate the specific testing for UNTP and for an extension.

## UNTP Testing (the blue sections in the diagram)

The UNTP testing is intended to provide implementors the ability to validate that they have a complete valid reference implementation of UNTP. This testing gives a starting point so that implementers know that their implementation is starting as UNTP compliant and that any extensions that they make need to have validations added to ensure continued UNTP interoperability.

## **Tier 1: UNTP Test: Technology Interoperability Testing**

This testing is intended to provide implementers confidence that the technical implementation is correct. It is primarily focused on W3C verifiable credential compliance.

## **Tier 2: UNTP Test: UNTP Schema Testing**

This tests that the schema that are being used to issue credentials are a valid UNTP schema. This will enable an implementor to validate that they are starting with a valid UNTP set of schema.

## **Tier 3: UNTP Test: Trust Graph Testing**

This validates that the links between the different components of the UNTP schema (DPP, DTE, DCC) are validated. It is anticipated that this is relatively simple at generic UNTP level, but will get more involved for each extension.

## **Extension Testing (grey boxes)**

UNTP has been designed so that each industry and jurisdiction can extend UNTP to meet their specific business, governance and community needs. In order to ensure that supply chain customers downstream can consume details from their upstream supply chain partners - it is important that extensions maintain UNTP compliance. Extension testing is intended to provide that confidence to implementors.

## **Tier 1: Extension Test: Nothing?**

It is expected that there won't be changes at Tier 1 of the testing architecture for extensions. This is because we are using W3C standards and if there are requirements for extensions it is beyond the scope of UNTP to manage. We are including it in the architecture to facilitate future unforeseen needs.

## **Tier 2: Extension Test: Extension Schema Testing**

This testing is designed to ensure that as implementors are extending UNTP schema (DPP, DTE, DCC) to meet their specific needs that they are not breaking compatibility with UNTP and that they are able to provide the implementors of their extensions with confidence that their extension is correct.

## **Tier 3: Extension Test: Choreography Testing (Trust Graph Validation)**

This provides the ability for extendors to map the different credentials together to validate specific industry or regional scenarios. In Australia NATA is the national accreditor for laboratories - so the link from NATA to an accredited laboratory to a specific accreditation would be validated by a test in this component.

# Support

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Implementation Support

# Reference Implementation

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Reference Implementation

# Extensions Register

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Extensions Register

# Extensions Methodology

## ! INFO

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Overview

UNTP is designed as a common core that is usable by any industry sector or in any regulatory jurisdiction. This extensions methodology describes how to extend UNTP to meet the specific needs of any industry sector or regulated market in such a way that the extension maintains core interoperability with any other extension. This cross-industry and cross-border interoperability is a core value of UNTP because almost every value chain will cross industry and/or national borders.



In some cases, UNTP extensions are themselves UN projects - such as the extensions defined by the [UN critical raw materials traceability and transparency project](#). In most cases however, industry sectors and/or national projects will govern their own extensions.

To be registered as UNTP conformant, an extension MUST remain interoperable with UNTP. This is achieved by limiting extensions to the extension points described below and be completing interoperability testing.

## Extension Points

**Schema Extensions**

**Vocabulary Extensions**

**Identifier Extensions**

**Choreography Extensions**

**Testing Extensions**

# Extensions Register

 **INFO**

Please note that this content is under development and is not ready for implementation. This status message will be updated as content development progresses.

## Extensions Register

# **Implementations Register**

# **Implementation Conformity**

# **Implementations Register**