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Technical dialogue on global solutions for digital, sustainable and resilient value chains in support of the green and digital transformations

Draft Recommendation No. 49: Transparency at Scale

Submitted by the Bureau

Summary

In May 2023, the United Nations Centre for Trade Facilitation and Electronic Business launched the project titled "Transparency at scale – digital solutions for trust, resilience and sustainability: verifiable credentials in supply chains". Among the deliverables of this project is Recommendation No. 49, which will offer policy guidance on the implementation of traceability and transparency at scale through digital instruments, such as the United Nations Transparency Protocol for Digital Product Passports.

Aimed to address increasing demand for policy action that ensures the integrity of both product sustainability claims and corporate sustainability disclosures, draft Recommendation No. 49: Transparency at Scale, which completed a 60-day public review period on 19 June 2024, is tabled to the thirtieth Plenary of UN/CEFACT for information and discussion.

Document ECE/TRADE/C/CEFACT/2024/6 is submitted to the thirtieth session of the UN/CEFACT Plenary for information.

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A. Introduction

1. Over the last two decades, there has been a marked increase in both product sustainability claims and in legislation that requires sustainable business practices and/or reporting[1]. This demand is driven by environmental urgency, the scale of forced and child labour, and by a growing incidence of counterfeits, fraud and substandard products.

2. Recommendation No. 49 was born out of the increasing demand for policy action that ensures the integrity of both product sustainability claims and corporate sustainability disclosures. It has also grown out of the practical challenges faced by the United Nations when providing technical assistance to support implementation of the United Nations Sustainable Development Goals (SDGs) in textile and leather value chains[2]. Recommendation No. 49 builds upon this experience and provides policy guidance on the implementation of traceability and transparency at scale, which can have a meaningful impact on sustainability outcomes in the following ways:

- By ensuring the **verifiable integrity** of product sustainability claims;
- By facilitating the **cost-effective exchange** of value chain[3] data using **interoperability standards** that simplify automation;
- By providing **confidentiality, privacy and security** guidance so that each actor can make their own choices about what information to share; and
- By making credentials and claims (of all kinds) more tangible to **increase their value** in business bottom-line reporting and their utility to society.

3. This recommendation looks at the policies needed to reach the above objectives and address the related challenges described in this document. This document recommends the implementation of digital tools such as product passports and verifiable credentials. To ensure that such implementations are interoperable, United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) is developing a detailed suite of technical specifications called the United Nations Transparency Protocol (UNTP)[4].

4. This recommendation focuses on digitalisation at the scale necessary to drive increased transparency in global value chains. It does not make new recommendations for mandatory disclosures as that is already well covered by existing and future regulations and protocols.

5. More detailed information on UNTP can be found in the guidelines in the second part of this recommendation.

B. Target audience

6. This recommendation offers a basis for action for both public sector policymakers and private sector decision makers who wish to advance sustainability in value chains through greater transparency and thereby achieve the following:

- Increase the sustainability of their economies;

[1] This is often referred to as economic, social and governance (ESG) reporting.

[2] In particular, these difficulties relate to providing assistance in implementing *Recommendation No. 46: Enhancing Traceability and Transparency of Sustainable Value Chains in the Garment and Footwear Sector* (available at https://unece.org/sites/default/files/2023-10/Rec46-ECE-TRADE-463E.pdf).

[3] See also the Cambridge Institute for Sustainability Leadership webpage, which defines 'value chain' versus 'value chain'. Available at https://www.cisl.cam.ac.uk/education/graduate-study/pgcerts/value-chain-defs.

[4] https://uncefact.github.io/spec-untp/

- Create a level playing field for sustainable businesses and honest actors;
- Maintain or improve export market access and competitiveness for their products in the context of increasing barriers to trade related to product sustainability concerns; and
- Reduce the complexity, time and cost associated with validating the conformity of imported goods with national or regional sustainability requirements.

7. This recommendation and its guidelines can also serve as a reference for other value chain stakeholders in their efforts to support the uptake and implementation of the recommended measures. These industry stakeholders include but are not limited to the following:

- Regulatory, border-control and market surveillance agencies;
- Non-governmental authorities such as ESG standards organizations and certification bodies;
- Value chain actors, including producers, manufacturers, retailers, recyclers and logistics providers;
- International and national financial and corporate reporting standard setters;
- Banks and insurance companies involved in the financing of value chains and facing sustainable finance regulations; and
- Other interested parties including software platform vendors, industry associations and other financial institutions.

C. Purpose and benefits

8. Globally, consumers[5], capital markets and regulators are demanding increased sustainability in products and processes and transparency in corporate reporting[6] about how sustainability has been taken into consideration in products.

9. This demand is manifested in willingness of consumers to pay more for sustainable products, accepted business practices, improved access to capital, carbon-related tariffs and due diligence regulations. A few years ago, the consequence of non-compliance was limited to some bad press. Today, emerging regulations such as the European Union (EU) directives on due diligence[7], green claims[8] and deforestation[9] may impose penalties as high as 4 per cent of global revenue.

10. As the regulatory requirements for sustainability increase[10] as well as the anticipated increase in the commercial value attached to sustainable products, the incentives also increase for faking sustainability claims (i.e. greenwashing). In light of increasingly severe consequences, regulators and reputable industry actors are demanding reliable evidence and disclosures to support sustainability claims (products, processes, or organizations or facilities). The best and most reliable evidence is high integrity data from transparent value

[5] For an example of a sector where sustainability is in high demand by customers (cosmetics), see the article by the Convention on Biological Diversity, “The Cosmetic Shift”, 25 June 2021, available at https://www.cbd.int/article/cosmetic-shift.

[6] https://www.oecd-ilibrary.org/sites/8416b635-en/index.html?itemId=/content/publication/8416b635-en

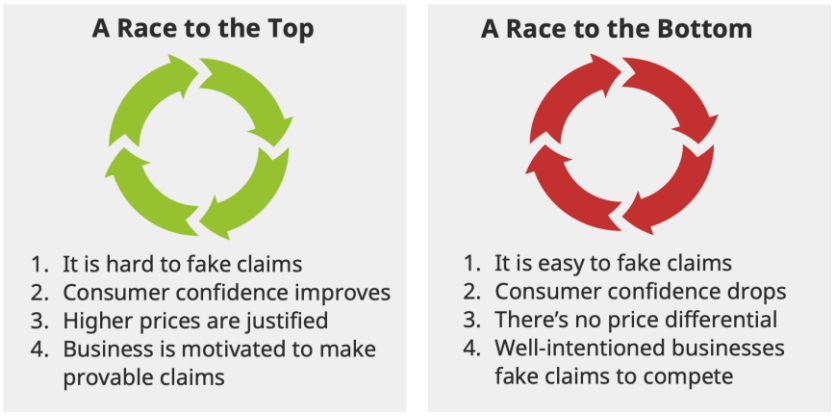
[7] See https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en.

[8] See https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/753958/EPRS_BRI(2023)753958_EN.pdf.

[9] See https://environment.ec.europa.eu/topics/forests/deforestation/regulation-deforestation-free-products_en.

[10] For information about countries with mandatory ESG reporting, see https://blog.worldfavor.com/countries-affected-by-mandatory-esg-reporting-here-is-the-list.

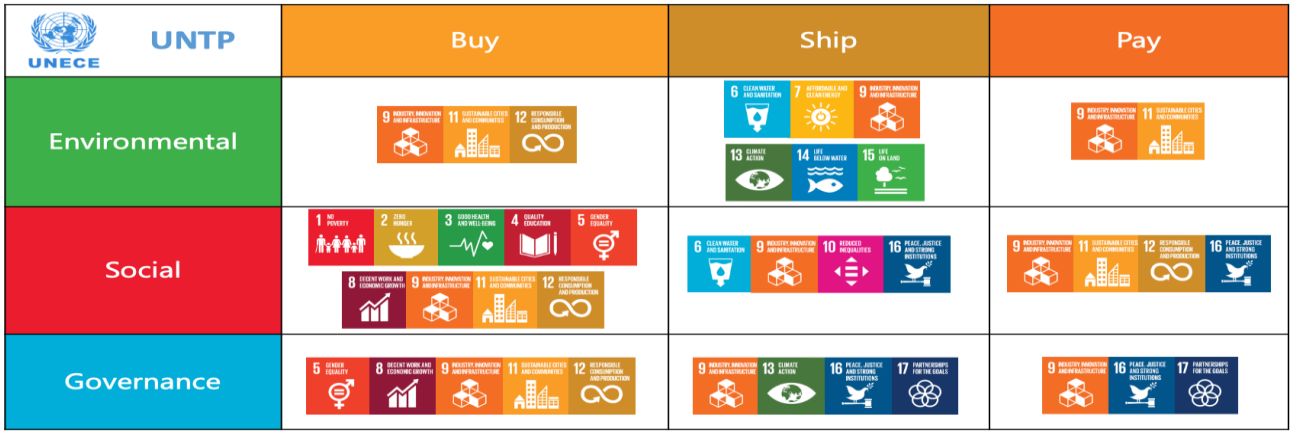
chains. In essence, sunlight is the best auditor. Value chain transparency creates a virtuous circle of behaviour that results in a race to the top.



11. The primary purpose of this recommendation and its supporting guidelines and standards are to make it easier for supply chain actors to verify the claims that their suppliers make and to create significant reductions in the incidence of greenwashing by ensuring unsustainable behaviour is more evident[11]. This will also increase the value of legitimate sustainability credentials from value chain actors that have implemented sustainable practices. This recommendation will have achieved its purpose when the following non exhaustive list of outcomes are realised:

- Most value chain goods shipments are accompanied by verifiable sustainability performance data;
- Greenwashing and social washing are niche activities that are easily detected and quickly penalized by markets and regulators;
- Products with the best sustainability characteristics can out-compete on market access and pricing;
- Businesses value sustainability and other credentials as assets and sources of comparative economic and competitive advantage; and
- Counterfeit and substandard products are easily detected, efficiently recalled from distribution and result in a less lucrative business model.

12. In summary, this recommendation supports implementation of the United Nations Sustainable Development Goals in value chains, in particular in its buy, ship and pay activities, by providing the tools needed for accountability and governance.



[11] For an overview of EU plans to reduce greenwashing, see https://www.europarl.europa.eu/topics/en/article/20240111STO16722/stopping-greenwashing-how-the-eu-regulates-green-claims.

13. This recommendation and its supporting guidelines provide advice and practical measures for implementing value chain traceability and transparency and aim to provide the following benefits:

- Ensured reliability for non-financial reporting and sustainability claims about materials, products, processes and facilities;
- Confidence that sustainability claims meet reasonable due diligence requirements;
- Simplified and more confident corporate sustainability disclosures[12] such as Scope 3 greenhouse gas emissions[13];
- Improved export market access and/or reduced border tariffs;
- Improved access to capital, insurance and trade finance services for sustainable actors;
- Reduced implementation costs and burdens on businesses, especially SMEs, through the use of:
    - existing business systems and existing product identifiers and
    - open, free-of-charge standards that encourage innovation, prevent monopolistic practices and allow for large-scale, global implementations;
- The ability to be implemented by stakeholders with diverse levels of technological awareness and capability;
- Independent implementation by any value chain actor who wishes to do so, without the need to consult with or depend upon others. There are hundreds of thousands of value chains which change constantly, and on short notice, so this is an essential feature if there is to be global coverage; and
- Simpler product recalls that ensure better consumer safety.

D. Challenges and the United Nations Transparency Protocol solution

14. There are significant challenges in the implementation of value chain transparency at a global scale and in achieving the benefits described above. To solve these challenges, the UN/CEFACT is developing and maintaining a package of freely available standards called the United Nations Transparency Protocol (UNTP). This protocol leverages and builds upon existing open standards from UN/CEFACT including the buy-ship-pay reference data model[14]. UNTP also builds upon standards from the International Standards Organisation (ISO) and the World Wide Web Consortium (W3C).

15. The UNTP will include many capabilities, most of which are discussed below in the chart on challenges. These include the following two key features:

- A United Nations Digital Product Passport (UN/DPP) that is designed to carry sustainability and other data about goods, specified in transactions, exchanged in value chain. Since almost every value chain crosses industry boundaries and jurisdictional boundaries, the UN/DPP is a generic cross-industry and cross-border standard that can be extended to meet specific industry or jurisdictional needs while maintaining cross-industry and cross-border interoperability;

[12] For information about ESG reporting standards see https://sustainablefuturenews.com/policy-and-regulation/esg-reporting-standards-in-2023-everything-you-need-to-know/, and for information about countries with mandatory ESG reporting see https://blog.worldfavor.com/countries-affected-by-mandatory-esg-reporting-here-is-the-list.

[13] A simple explanation of the three different scopes for greenhouse gas emissions measurement and an in-depth discussion of scope 3 can be found at https://www.unglobalcompact.org.uk/scope-3-emissions/.

[14] https://unece.org/fileadmin/DAM/cefact/brs/BuyShipPay_BRS_v1.0.pdf

- Digital product conformity credentials that add auditable trust for claims about product attributes such as origin and sustainability. These credentials can prove the identity (of products, facilities and business entities) thus reducing identity fraud and counterfeiting as well as greenwashing.

16. The UNTP is complementary to national initiatives such as the European Union DPP which regulate goods at the point of market entry. The UNTP is an international cross-border and cross-industry standard that is focussed on the upstream supply chain. Therefore, it provides the high integrity feed-stock about upstream supply chains so that national mandates or industry specific digital product passports can be more confidently issued. UNTP also provides an interoperable and extensible foundation for national or industry specific initiatives as described in Part II, Chapter D, section 3.

17. The UNTP is under development and will be tested through pilot programmes throughout 2024 so that it is ready and stable for wide scale adoption from 2025.

Challenge description	*The UNTP role in addressing this challenge*
1.4.1 Complex dependencies and scalability	
The world's value chains involve millions of independent actors that exchange billions of goods shipments in complex and dynamic value chains that cross industry and national boundaries. Any solution that depends on different actors agreeing to use common and/or centralized systems cannot scale to meaningful volumes.	The UNTP will not depend on or require any single technology or platform. Instead, it is a suite of interoperability standards and implementation guidelines that will allow any number of different systems to participate in a global value chain transparency ecosystem. Each actor can implement the UNTP without depending on others.
1.4.2 Business incentives	
For value chain actors to invest in being more sustainable or more transparent, material incentives need to exist. Today, for most suppliers there are no incentives because the data to hold them accountable does not exist. As a result, buyers, especially those closer to the finished-goods end of value chains, often use industry averages to estimate the sustainability performance of their value chain (and thus their products). This use of averages removes any incentive for suppliers to compete on sustainability performance. Buyers also lose a key lever to improve their own performance based on differentiated supply.	The UNTP will include a digital product passport (DPP) that is designed to carry sustainability data about each goods shipment at each step of the value chain. The DPP provides a mechanism for suppliers to differentiate their products based on sustainability performance and allows buyers to meet corporate disclosure requirements and manage improvements to their own sustainability performance. This provides buyers the ability to select products that have a precise sustainability profile. This translates to purchase/pricing signals to suppliers and it may create incentives to improve their business practices, data collection standards and other sustainability activities to meet the needs of their buyers.

Challenge description	*The UNTP role in addressing this challenge*
1.4.3 Risk, trust and due diligence	
Value chain actors are increasingly subject to due diligence regulations that impose sustainability obligations, not only on their own business operations but also on their upstream value chain. Non-compliance penalties and reputational damage present increasingly severe consequences if/when supplier sustainability claims are found to be untrue. To mitigate these risks, buyers need mechanisms to verify the sustainability claims made by their suppliers.	The UNTP will include digital conformity credentials (DCC) which add auditable trust, based on second party or third-party attestations, to sustainability claims as well as to identities (of products, facilities and business entities). Together these verifiable credentials can reduce identity fraud and counterfeiting as well as prevent fraudulent sustainability claims. This increases the value of DPP data and facilitates compliance with due diligence obligations. In addition, UNTP will use a classification scheme for sustainability data that enables buyers to align the goods and services that they procure with corporate disclosure requirements.
1.4.4 Systems stability and long-term data access	
The UNTP articulates a ‘publish / discover’ model for supply chain data interoperability that is designed to work across industry domains, international borders and without any prior knowledge of the downstream systems that any supply chain actor may select. When goods pass through intermediaries, or remain in use/storage for extended periods, then buyers may not even know who to ask about the sustainability characteristics of upstream products. Traceability and transparency solutions that depend on digital connections between every actor are fragile.	The UNTP will define a mechanism for the discovery of product sustainability information that is scalable, persistent over time and can use existing product and entity identifiers. It ensures that a product’s DPP and conformity credentials can always be found and are accessible even when goods have passed through multiple intermediaries or after the passage of time (for example by recyclers after years of market use). With UNTP, if you have the goods then you will be able to get the data about the goods.
1.4.5 Digital maturity and unequal adoption	
Every value chain has actors with diverse levels of digital maturity and capacities for change. Any traceability or transparency framework that requires the same level of digital maturity from all actors in a value chain is unrealistic and bound to fail.	Addressing this issue, the UNTP is designed to be “paper compatible” so that each implementer can go digital without any dependency on their value chain partners to do the same. This is done by providing a human readable rendering of every digital document and providing links to the digital version via QR code or other digital identifier.

Challenge description	*The UNTP role in addressing this challenge*
1.4.6 Privacy and confidentiality	
While value chain transparency is a powerful tool to counter greenwashing, it must be balanced against the risk of leaking commercially sensitive information. In general, value chain actors will withdraw participation rather than risk loss of commercially sensitive data. To further complicate this challenge, there is a wide variation across industries and between different actors regarding what data they consider to be commercially sensitive.	The UNTP will use a confidentiality and privacy-preserving model for data sharing that empowers each actor to choose which parts of their product and sustainability information they wish to share. The security model allows DPP issuers to choose what information is public, what is accessible to certain authorised roles, and what is accessible only to the buyer / user of the specific product. This model also includes the ability to combine the different techniques so that supply chain actors can exercise sovereign control over their data.
1.4.7 Interoperability across industry and national boundaries	
Various national or regional regulations are emerging that impose requirements to issue digital product passports for goods sold into the regulated market. There are also several industry-specific initiatives such as battery and textile passports. Since almost every value chain crosses industry boundaries and jurisdictional boundaries, there will be interoperability challenges at each boundary.	UNTP is designed to be a generic cross-industry and cross-border standard that can be extended to meet specific industry or jurisdictional needs while maintaining cross-industry and cross-border interoperability. Therefore, the UNTP will complement and will not compete with regulated product passports and industry-specific product passports.
1.4.8 Possible implementation costs	
For a viable business case to exist, the costs to implement and operate digital traceability and transparency systems must be lower than the value derived from the data. Although it is expected that market price signals for more sustainable goods will provide some incentive, the evidence to date is that the price margins are low. Therefore, cost must be even lower.	UNTP will drive digitalisation costs to a minimum by: • Designing to minimise un-necessary change. For example, supporting existing product identifiers and data carriers. • Keeping standards simple and cheap to implement. • Avoiding commercial lock-in through standardisation • Providing free open source implementations.

E. Recommendations

18. The UN/CEFACT at its 30th Plenary session, agreed to recommend that governments take the actions listed under the areas shown below.

1. Implement a national traceability and transparency framework

19. Governments should implement national traceability and transparency frameworks to support their national sustainability commitments and improve their export market competitiveness. National frameworks that conform to UNTP will enjoy lower cost, reduced risk and improved cross-border interoperability. Specifically, it will do the following:

- Encourage the use of DPPs and conformity credentials as means to counter greenwashing and to provide business incentives for sustainable production. (Note that the UNTP will allow for an extension to meet the needs of specific sectors or branches of the economy that focuses on a particular type of economic activity, and national environments);
- Require that DPPs and conformity credentials conform with the minimum requirements for interoperability set out in the UNTP conformity specification[15];
- Accept DPPs and conformity credentials for sustainability compliance information for imported goods; and
- Include the use of UNTP for exchanging product data under bilateral and multilateral agreements when these include such data exchanges.

2. Develop government services in support of national traceability and transparency framework

20. Regulators define rules, issue permissions and manage compliance. This role is enhanced when implementing UNTP because regulators will also be able to act as UNTP trust anchors. A trust anchor uses electronic signatures and "certified" links to validate (or "notarize") electronic credentials such as permits, licences, certifications, lab results, etc. This gives the party receiving the credential faith in its veracity. Regulators are already performing this role in their economies, but usually not in a digitally verifiable way. The following regulators should act as digital trust anchors:

- Government entities with strong business identity verification processes (e.g. company registers, tax authorities) should issue registration documents as digital Verifiable Credentials (VCs)[16];
- Competent authorities, such as departments of agriculture, environment, energy and resources, should issue all permits and certificates as VCs;
- Land registration authorities should issue geolocated land titles and cadastral boundaries as VCs;
- Export regulators should consider extending existing export certificate schemes such as certificates of origin and phytosanitary certificates as VCs; and
- Customs authorities should consider leveraging verifiable product passport data to increase import border compliance, improve risk analysis outcomes and facilitate trade. The digital product passport could be to goods shipments what a national passport is to human travellers.

3. Promote uptake of national traceability and transparency frameworks

21. Governments should:

- Consider the guidelines referenced by this recommendation in the establishment of their national traceability and transparency policy; and
- Consider making the ECE Sustainability Pledge[17] and encouraging value chain actors in their economy to do the same.

22. Part II of this recommendation provides a high-level overview of the technical content in the United Nations Transparency Protocol. They also describe the obligations and opportunities that UNTP could create for different non-governmental value chain actors when implementing traceability and transparency.

[15] Available by July 2024 at https://uncefact.github.io/spec-untp/docs/implementations/Conformity.
[16] See ECE white paper on eDATA credentials at https://unece.org/trade/documents/2023/10/white-paper-edata-verifiable-credentials-cross-border-trade.
[17] For more information, see the Sustainability Pledge website at https://thesustainabilitypledge.org/.

F. Conclusion

23. National authorities increasingly seek to improve environmental performance, reduce greenwashing and respond to citizen demands through regulatory initiatives such as sustainability reporting requirements and consumer-centric digital product passports. By designing national initiatives with the United Nations Transparency Protocol as the basis around which national and sectoral requirements are built, regulators will be able to do the following:

- Reuse a rich and tested body of work;
- Better align their requirements with international best practice and requirements;
- Simplify and reduce compliance costs for domestic industries that need to exchange data with international trading partners; and
- Build and adapt value chain transparency as the need arises, without having to impose mass-migration and adoption.

24. Simply put, both this recommendation and its guidelines encourage actors to leverage what they are doing today, and extend to be more digital and verifiable way. That way, many aspects of due diligence for sustainability can be automated at scale and unsustainable behaviour will make up a smaller and smaller portion of the global economy.

Part II: Guidelines for Recommendation No. 49 on Transparency at Scale

25. Recommendation No. 49 and these guidelines recommend that value chain actors implement solutions that conform to UNTP as a cost-effective and scalable means to achieve traceability and transparency at scale. However, because UNTP will represent a decentralized protocol that could have thousands of implementers, it is critical that each implementation is interoperable with others. Reliable interoperability requires detailed specifications, careful version management, and tools such as test services so that each implementer can assess their conformity and be confident that they will be able to integrate seamlessly. Therefore, normative implementation guidance is being developed at the UNTP website[18]. The remainder of this document provides an informative overview of the UNTP.

26. The UNTP is under development and will be tested through pilot programmes throughout 2024 so that it is ready and stable for wide scale adoption from 2025. Thereafter, the UNTP will be maintained and version managed as an ongoing resource for implementers.

A. Roles and opportunities for value chain stakeholders

27. Recommendation No. 49 describes the importance for society of traceability and transparency in value chains and recommends actions to be taken by policymakers, government authorities and regulators. This section looks at the opportunities that implementing traceability and transparency can offer value chain stakeholders, particularly through implementing the United Nations Transparency Protocol.

1. Sustainability standards organizations

28. Sustainability standards are defined by national and international standards authorities and industry-led organizations. There are a wide variety of governance arrangements in place that impact the legitimacy and value of published standards. Unlike regulators, standards bodies do not always measure compliance, which may be self-assessed or third-party audited by testing and certification bodies. There are hundreds of standards organizations which

[18] See the UNTP website at https://uncefact.github.io/spec-untp/.

collectively issue thousands of sustainability standards, each with dozens of specific requirements (i.e. rules). Most of these are published as PDF documents.

29. To facilitate the automated use of sustainability standards to assess compliance with regulatory requirements, standards-setting organizations need to identify the subject matter of their rules in a machine-readable format. For example, one rule may cover recycled content, another employee safety, another chemical usage, etc. This will allow the rules to be accurately referenced in conformity credentials. When sustainability standards organizations publish their requirements using a machine-readable vocabulary[19], they empower their community of certifiers to issue digital conformity credentials that unambiguously reference the scope of conformity claims so that the credentials can be digitally verified.

2. Accreditation and certification authorities

30. There is a well-established global framework[20] for the conformity assessment of entities, processes and products that has been in place for over 50 years. It provides assurance that products sold on a marketplace meet applicable quality, safety or sustainability standards. Under this framework, conformity assessment bodies (CABs) assess the conformity of products with recognized standards and issue conformity attestations to manufacturers. Furthermore, a global network of mutually recognized national accreditation authorities assess and accredit the CABs to ensure that they are suitably qualified organizations. Under this framework, verifiers of conformity claims can be confident not only that they are independently assessed but also that the assessing body can be trusted. UNTP will provide a standard way to digitally verify this chain of trust when accreditations and conformity assessments are issued as digital verifiable credentials.

3. Industry associations

31. There are over 100,000 industry associations worldwide. Most represent a specific industry sector within a specific jurisdiction. These member associations typically provide advocacy on behalf of their community and offer best practice advice.

32. There are two ways in which industry associations can support the implementation of the United Nations Transparency Protocol. The first is as a certifier and trust anchor. The second is as a service provider assisting members with implementation.

Industry associations as certifiers and trust anchors

33. Industry associations that develop and maintain standards may issue certificates of conformity for those standards. Issuing these certificates as UNTP verifiable credentials would not only allow suppliers to easily and reliably demonstrate their compliance with a standard to their clients and authorities but also eliminate the use of counterfeit certificates.

34. Industry member associations can also act as a trusted independent quota manager to counter mass balance fraud[21] among their membership and issue quota certificates, which could be verifiable credentials. The value of this service will increase if the industry association is accredited by either a national accreditation authority or a global environmental or human welfare organization.

35. The UNTP will also recognize other valuable chains of trust - for example, a farmer's environmental land management claims might be verified by an association or a community organization that is endorsed (a.k.a. accredited) by a well-known global environmental organization.

[19] Under development at https://uncefact.github.io/spec-untp/docs/specification/Vocabularies

[20] See the ISO CASCO conformity assessment tools website, available at https://casco.iso.org.

[21] Mass balance approaches, due July 2024. https://uncefact.github.io/spec-untp/docs/specification/MassBalance

Industry associations as implementation service providers

36. Another important way that industry member associations could support their members' traceability and transparency objectives will be to develop UNTP industry profiles that include targeted implementation guidance for their industry and jurisdiction.

37. In many cases industry associations create branding that distinguish their members' products in the marketplace and if an association member engages in fraudulent practices, it can quickly damage the reputation of an entire industry.

38. As a result, member associations will have a strong incentive to ensure that their membership adheres to a minimum level of quality. These quality standards could include industry-wide sustainability practices and, in the future, implementing UNTP to provide digital evidence of those practices.

39. Industry member associations could also develop training and implementation services, possibly in partnership with local service providers, thereby adding both a valuable service and a revenue stream for the member association.

4. Primary producers and manufacturers

40. Most physical products are made from 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 value chains. Manufacturers take raw or recycled materials to produce intermediate and then finished products. Recyclers are a special case, since they operate both at the end, middle (production scrap, tailings reprocessing etc) and the (re)start of circular value chains, so they are discussed separately below. Primary producers, recyclers and manufacturers collectively represent the upstream value chain for the branded products sold to consumers.

41. Primary producers and manufacturers can use the United Nations Transparency Protocol to strengthen their market positions, and their relationships with customers, by doing the following:

- Issuing digital product passports[22] (UN/DPP) for every batch or shipment of goods sent to their customers, thus allowing customers to easily incorporate data about their supplier's inputs, such as Scope 3 emissions, into their own products' environmental footprint data[23];
- Linking UNTP traceability events[24] to digital product passports, providing verifiable evidence of provenance that can support value chain resilience and can be used in determining preferential treatment decisions by customers and export market regulators. In addition, such information can support marketing claims such as, "Made in X[country]";
- Linking conformity credentials (certifications, lab results, etc.) to digital product passports, which adds trust to the sustainability claims in their UN/DPPs, thus increasing their products' value and/or market access; and
- Adding links to identity and location credentials that have strong trust anchors (i.e. regulators) because these will provide their products with strong anti-counterfeiting measures and will preserve the value of their sustainability actions.

42. Producers and manufacturers can choose to selectively remove[25] information from upstream credentials (such as supplier names, locations or prices) before passing them on to

[22] See the UNTP specification page on the digital product passport: https://uncefact.github.io/spec-untp/docs/specification/DigitalProductPassport (web content partially available at time of publication).

[23] End customers could also have option to access the UN/DPP data directly

[24] See the UNTP specification page on traceability events: https://uncefact.github.io/spec-untp/docs/specification/TraceabilityEvents (web content partially available at time of publication).

[25] See the UNTP specification page on confidentiality: https://uncefact.github.io/spec-untp/docs/specification/Confidentiality (web content partially available at time of publication).

their downstream customers. In this way, sustainability evidence can be passed on without revealing commercially sensitive information.

5. Brands and retailers

43. With some notable exceptions, brands and retailers take products from their upstream producers and manufacturers and sell them to the consumer (B2C) as opposed to producers and manufacturers whose sales are primarily to other businesses (B2B). Sales to the consumer market are highly regulated in most economies and some economies are starting to develop regulations that also require digital product passports to support informed consumer choice and/or improved recycling processes.

44. Brands and retailers must meet domestic regulations to ensure that sustainable practices are in place, both within their own companies and within their entire value chain. When brands and retailers are able to verify UNTP credentials linked to goods from their upstream suppliers, then they will be able increase confidence in their internal and external due diligence obligations and have the rich and verifiable information necessary to issue any consumer-centric digital product passports required under domestic regulations.

45. When brands and retailers will request UNTP credentials from their upstream suppliers then they are avoiding the challenges associated with imposing specific traceability software solutions on their value chain. Instead, they are simply requesting conformance with a common standard, irrespective of software platform.

46. When products are also equipped with the UNTP anti-counterfeiting measures[26] then consumers can not only verify sustainability performance but also confirm that the performance is associated with an authentic product and not a counterfeit. As a result, producers, manufacturers, brands and retailers can increase confidence that their sustainability investments are not being devalued by counterfeit products.

6. Recyclers and refurbishers and other post-consumer actors

47. Recyclers and refurbishers play a critical role in the transition to a circular economy[27]. Recyclers process used products into raw materials for reuse in new production processes. Refurbishers take old products and restore them for reuse. Other post-consumer actors include remanufacturers (who transform old products into new products) as well as repairers and resellers who prolong the lives of old products. The goal of all these processes is to improve sustainability outcomes through the reduced use of raw materials by prolonging product life and reusing existing resources. Recycling can also occur in upstream processes such as re-using waste from mining or manufacturing processes.

48. As regulators start to impose minimum recycled content requirements and other regulations supporting circularity, the current linear economic model (produce, use, dispose) will require significant changes if it is to provide enough recycled materials and "extended-life" products to meet regulatory goals and consumer expectations.

49. The UNTP is designed to support circular economies by including verifiable information on both the original and recycled content of products as well as their origin (for resellers) and repairability. The UNTP will incentivise manufacturers to design greater recyclability into new products and provides access to product data to better inform recycling processes.

50. When manufacturers optimize their product design for circular economy requirements and provide access to that information via UNTP digital product passports, then they are enhancing the end-of-life value of their products.

[26] See the UNTP specification page on counterfeiting: https://uncefact.github.io/spec-untp/docs/specification/Counterfeiting (web content partially available at time of publication).

[27] For a definition of circular economy, see https://en.wikipedia.org/wiki/Circular_economy.

51. One example is recyclers who can leverage this data (especially for high value products like electric vehicle batteries) to optimize the efficiency of their processes.

52. In another example, if recyclers issue UNTP passports with their recycled material shipments, they empower 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.

53. In some industry sectors such as textiles, recycling is challenged by the lack of durable and bulk-readable labels that are needed for cost effective sorting based on fibre types. This recommendation does not address this problem but notes with interest some innovations around RFID labelling woven into fabrics.

7. Environmental and human welfare organizations

54. There are many national and global not-for-profit organizations whose purpose is to promote environmental or human welfare causes. Some "trust marks", such as the WWF panda, have remarkably high global brand recognition. Although these organizations do not have the legal enforcement mechanisms of regulators, they can strongly influence product market success when their trust mark is added (or revoked). When these influential sustainability trust marks have established well-governed accreditation frameworks and issue (or revoke) UNTP verifiable credentials they can participate in the digital trust ecosystem as trust anchors, thereby multiplying the power of their brand to drive sustainable production practices.

8. Transport and logistics providers

55. The movement of cargo by sea, air and land accounts for around 10 per cent of global emissions[28] and, unless transport becomes more sustainable, will account for the largest fraction of global emissions by 2050. Transport (especially by road) therefore determines a key part of the emissions intensity of products. In the same way that UNTP will make sustainability credentials for products discoverable from batch identifiers, so UNTP will allow the sustainability credentials for transport services to be discoverable from consignment identifiers such as waybill numbers. These transport-service sustainability credentials can then be used when calculating the environmental footprint of the products in the consignments.

56. The sustainability impacts of transport and logistics should be incorporated into a product's footprint, either by the buyer or the supplier, in line with the INCOTERMS[29] in their sales contract. As producers, manufacturers, brands and retailers seek to drive improvements in sustainability performance they will be incentivized to choose low emission transportation services. This will increase the value of sustainable transport services per tonne-kilometre.

9. Financial institutions

57. 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 customers' annual reporting, according to sustainability disclosure standards[30]. Just as

[28] MIT Climate Portal, "Freight Transportation", 3 February 2023, available at https://climate.mit.edu/explainers/freight-transportation (accessed 17 March 2024).

[29] For information on INCOTERMS, see ECE Recommendation No. 5 (2020), available at https://unece.org/sites/default/files/2023-10/Rec5-ECE-TRADE-458E.pdf.

[30] For further reading, see the International Financial Reporting Standards Foundation (IFRS) Sustainability Standards Navigator website, available at https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/.

corporate financial statements such as profit and loss statements and balance sheets are created by aggregating financial transactions such as bills, invoices and payments; so corporate-level annual sustainability metrics are constructed by aggregating operational data such as that from UNTP digital product passports.

58. When banks provide investment capital on preferential grounds based on sustainability performance, they should look favourably on businesses that have implemented UNTP digital product passports in their value chains. The data from UNTP-based operational processes can be directly aggregated to arrive at IFRS-based corporate sustainability performance reporting figures, thereby reducing the financial risk associated with the investment. Furthermore, when banks are able to use UNTP digital product passport information and conformity credentials to digitally verify sustainability compliance for shipments covered by letters of credit, then they can more confidently release payment.

59. Additional considerations for financial institutions include (but are not limited to) recommend inclusion in term sheets and trade finance (ie cashflow) opportunities.

10. Software developers

60. Software developers provide the system and software tools that are needed to implement UNTP. These tools hold the data that is needed to issue credentials and will also process the data from credentials that are identified, located and verified. Such tools include enterprise resource planning (ERP) systems, sustainability management systems and traceability platforms.

61. By implementing UNTP, software developers will be able to empower their customers to participate in global, transparent value chains. For large organizations with existing, heavily customized systems, UNTP implementation may be a customer-specific project. For smaller organizations that use off-the-shelf software, UNTP implementation is more likely to be provided via a feature in a new release of one of the following types of software package(s):

- ERP systems, which will be the natural issuers of UNTP digital product passports and traceability events because they manage the finance and logistics operations around the manufacturing, sale, and shipment of products. ERP providers have the opportunity to embed UNTP DPP capability into their systems or partnering with 3rd party traceability solution providers;
- Sustainability management systems, which are the source of sustainability data, such as carbon intensity, that will populate UNTP digital product passports as well as the conformity credentials referenced by the digital product passport; and
- Traceability platforms which give visibility to the flow of goods and trace products, materials or components across a value chain. Rather than gathering this data directly from upstream actors, UNTP will provide a means to gather the same data by following verifiable linked data trails. These platforms can hold all or part of a trust graph. They can discover a trust graph and render it for their customers. They can also facilitate the validation of the traceability graph by a conformity assessment body (CAB).

62. These three system types may exist in separate software products or may be parts of a more integrated system. Some ERP systems also manage sustainability data. Some sustainability platforms include traceability functions. It is likely 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 will define a simple and implementable standard for software developers to empower their customers to connect to global, sustainable value chains.

11. Regulators

63. Regulators can implement policies to increase transparency via public disclosures at entity, facility, and product level. Additionally, regulators can provide a unique role as trust anchors - do digitally and verifiably what you already do today (eg business registration). A business identity verified by the local government (governments already do this validation as part of the business registration process) provides higher confidence to trading partners. Particularly if the identity is significantly more difficult to counterfeit because it has digital signatures embedded in the identifiers.

B. Business case

64. Unsustainable practices in global value chains have led to well-documented challenges for humanity and our planet. These include, among others, climate change, deforestation, biodiversity loss, fresh-water depletion and forced labour. As global awareness of these challenges rises, there is increasing pressure to address them. Regulators, markets, policymakers and local communities are taking action. This pressure has resulted in three key trends:

- **Increasing regulation**: Examples include the European Sustainability Reporting Standard (ESRS)[31], the Carbon Border Adjustment Mechanism (CBAM)[32] and the United States Inflation Reduction Act (IRA)[33];
- **Access to finance**: Examples include preferential terms for investment capital and trade finance from financial institutions for businesses that report high sustainability standards based on International Sustainability Standards Board (ISSB)[34]; and
- **Consumer sentiment**: Increasing demand for sustainable products and supporting evidence. Regulatory measures such as the European Ecodesign for Sustainable Products Regulation (ESPR)[35] call for a consumer centric Digital Product Passport (DPP) that will empower consumers to make informed choices for sustainable products.

65. These trends provide strong financial and non-financial incentives (or obligations) for value chain actors to demonstrate improved sustainability.

66. However, these same financial incentives will also drive some value chain actors to make false claims or to overestimate their sustainability claims. This is called “greenwashing,” and it poses a substantial risk for value chain actors that consume or sell such products.

1. Risks

67. Value chain actors that fail to meet the sustainability expectations of their customers or, worse, make false claims about their product sustainability characteristics may face severe consequences:

[31] See European Commission, “The Commission adopts the European Sustainability Reporting Standards”, news article, 31 July 2023. Available at https://finance.ec.europa.eu/news/commission-adopts-european-sustainability-reporting-standards-2023-07-31_en.

[32] See the European Commission’s webpage on CBAM at https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en.

[33] See the Inflation Reduction Act Guidebook at https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/.

[34] For information about the ISSB, see https://www.ifrs.org/groups/international-sustainability-standards-board/.

[35] For information on the ESPR, see https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en.

- **Market access**: Entire markets may be closed to some products. For example, the European Union Deforestation Regulation (EUDR)[36] will ban access to EU markets for products that are linked to deforested land in any part of their value chain;
- **Penalties**: Very severe financial penalties may apply for repeated non-compliance. For example, the maximum penalty for due diligence regulation non-compliance is 4 per cent of global revenue[37]; and
- **Litigation**: Consumers are increasingly aware of greenwashing tactics and able to detect fraudulent or weak claims such as carbon-offset schemes that are non-additive or double counted. This can expose value chain actors to costly individual or class action litigation and/or significantly higher insurance premiums.[38]

68. The value of mitigating risks such as these should inform the benefit assessment in UNTP implementation business case development.

2. Benefits

69. Value chain actors that focus on continuous improvement of their product sustainability will enjoy benefits that have a material impact on their business. The UNTP DPP and related conformity credentials represent a bundle of value for implementers:

- **Reduced tariffs**: Carbon intensity claims in UN/DPPs represent the Scope 3 emissions of the shipment of goods. When value chain actors can differentiate their products from industry averages and attach sufficiently trustworthy evidence, then they may achieve preferential tariffs at importing country borders;
- **Increased unit prices**: Sellers of products with verifiable sustainability evidence may achieve higher unit prices from value chain buyers that are seeking to improve their own sustainability performance or reduce their due diligence risk;
- **Simplified disclosures**: Organizations that receive digital product passports from their suppliers will have a simple mechanism to assess their value chains verifiably sustainable products, processes and business practices;
- **Preferential finance terms**: Financial institutions offer improved terms for capital and trade finance to organization with verifiably sustainable products and processes; and
- **Reduced counterfeiting**: Brands that face losses from counterfeiting will be able to reduce those losses by implementing UNTP anti-counterfeiting measures.

3. Costs

70. UNTP implementation will require changes to business systems to conform to the UNTP standards:

- For large businesses, this will most likely require some IT system integration work to adapt existing business systems. Since UNTP is designed to be pluggable into existing systems and processes, the implementation is usually a small project;
- For small and medium-sized businesses that use off-the-shelf commercial software, the most likely pathway to UNTP implementation is through existing software-

[36] See https://environment.ec.europa.eu/topics/forests/deforestation/regulation-deforestation-free-products_en

[37] European Parliament News, "Parliament adopts new law to fight global deforestation", press release, 19 April 2023. Available at https://www.europarl.europa.eu/news/en/press-room/20230414IPR80129/parliament-adopts-new-law-to-fight-global-deforestation.

[38] For an article on the subject, see expert article "ESG risks emerging as a future driver of liability losses", *Global Claims Review 2022,* July 2022. Available at https://commercial.allianz.com/news-and-insights/expert-risk-articles/claims-report-22-ESG-risks.html (accessed 17 March 2024).

solution vendors when they implement support for UNTP as part of their standard product-development roadmap;

- Long term operations costs must be lower than benefits / incentives. And because incentives will be a small fraction of product prices, costs must be much lower. UNTP drives commoditisation through standardisation; and
- Even if there is a long term positive business case, there could be prohibitive start-up costs. The UNTP Community Activation Program (CAP) aims to reduce start-up costs by bringing including sustainable finance providers as well as sharing some costs at community level.

4. Templates and benchmarks

71. The UNTP implementation guide website will provide some tools to assist potential implementers with the development of their business case for UNTP implementation:

- Business case template documents that can be copied and customized/completed, providing a fast-track framework for each implementer to create their case for change;
- Benchmark costs and benefits from previous implementers, which can be used as order-of-magnitude cost/benefit estimates for new implementers;
- The UNTP will include a list of open source reference implementations and
- A register of implementers and service providers.

C. The United Nations Transparency Protocol

72. The United Nations Transparency Protocol (UNTP) defines the detailed specifications for interoperable implementations. This section provides an overview of UNTP and an outline of the purpose and scope of each component of the specification. The UNTP is under development and will be tested through pilot programmes throughout 2024 so that it is ready and stable for wide scale adoption from 2025.

1. Design principles

73. The following describes the key design principles underpinning this recommendation's approach to solving the scalability challenges:

(a) Platform agnostic: The solution should not require or call for specific platforms. Rather, it should define an open protocol that any system or platform can implement;

(b) Simplicity: The protocol should be as simple as possible to make it easily understandable, pluggable (into existing systems) and with minimal implementation costs;

(c) Flexibility: The protocol should be broken down into separately implementable components with a minimal core, allowing each implementer to choose the optional components that suit their needs;

(d) Testability: Each implementer should be able to test their implementation so that they can confirm conformity and be confident that their implementation will be interoperable with others;

(e) Extensibility: The UNTP should focus only on cross-industry core features and should provide an extensions methodology that allows specific industry sectors and jurisdictions to extend the UNTP without breaking cross-industry interoperability;

(f) Privacy preserving: The protocol should empower each actor to choose their own balance between confidentiality and transparency, sharing only what they want (subject to minimum disclosure requirements), when they want and for the purpose(s) they want. The UNTP provides flexibility for industry or regional extenders to require

specific elements to meet their needs for traceability, market access or other regulatory or business specifics;

(g) Secure: The protocol should leverage international best practices and standards with respect to cybersecurity;

(h) Trustworthy: The protocol should allow sustainability claims to be clearly linked attestations assured by a third party (accreditation body, conformity assessment body, governmental authority) or other recognized trusted anchor so that claims can be verified and trusted;

(i) Inclusiveness: The protocol should not unfairly disadvantage smaller businesses, developing nations or organizations with lower digital maturity;

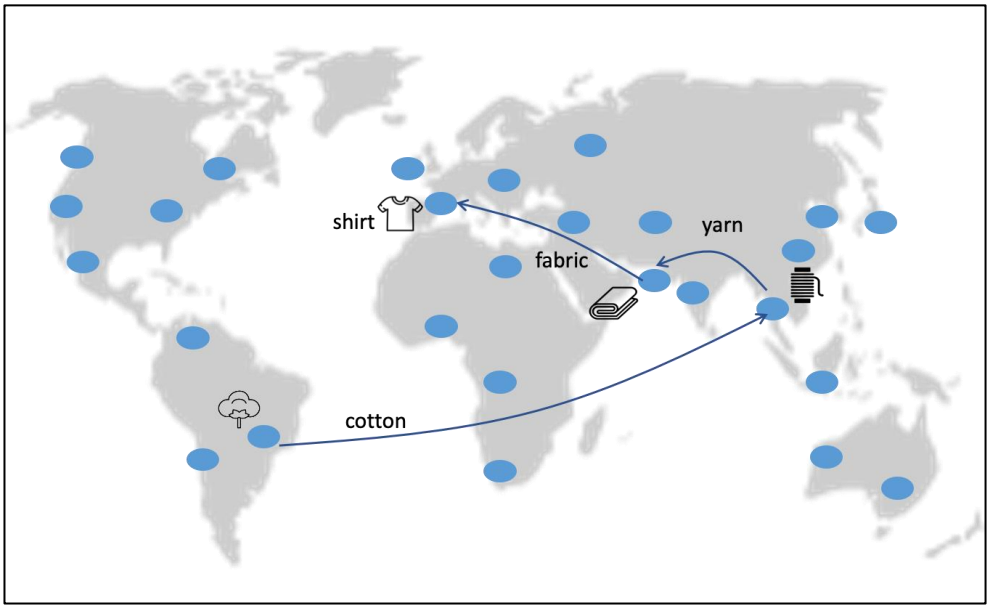
(j) Incentivizing differentiation: The use of industry averages for sustainability metrics such as carbon intensity is common throughout value chains because it is simple. But it also removes any incentives for individual organizations to differentiate their products based on sustainability outcomes. The protocol should enable incentives for sustainable development by providing each actor with the means to differentiate their products; and

(k) Independently implementable: The protocol should avoid dependencies between actors as well as the need for coordination so that each actor can proceed at their own pace. The protocol should not assume all actors have high technology maturity, ideally providing a seamless pathway from paper documents.

2. A global transparency protocol

74. The basic premise of UNTP is that value chain transparency data is already distributed across thousands of independent systems and that a viable and scalable traceability and transparency framework must expect that the data will remain distributed but must become discoverable and linkable.

75. The UNTP is based on a fully decentralized data architecture that does not depend on any single technology or platform. Instead, it defines the interoperability standards which can allow thousands of systems to participate in a global value chain transparency ecosystem.



76. Since almost every value chain crosses industry boundaries and jurisdictional boundaries, the UN/DPP is designed to be a generic cross-industry and cross-border standard that can be extended to meet specific industry or jurisdictional needs while maintaining cross-industry and cross-border interoperability. In the diagram above the blue dots can represent a system, a business, an industry body, or a traceability system—the key feature is that each

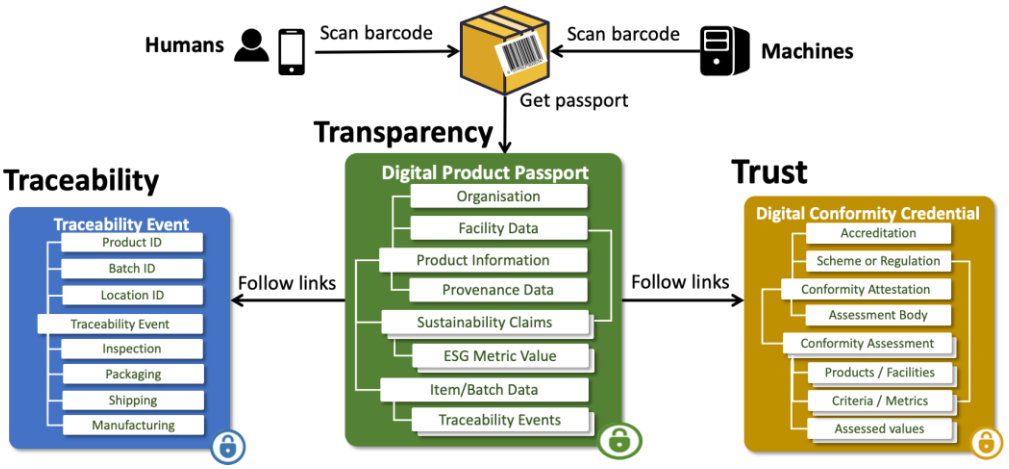
dot has a boundary that data needs to be shared beyond and the UNTP provides the guidance to share data beyond the natural system boundary.

77. UNTP maximizes reuse of existing investments by building upon existing open standards from global standards bodies.

3. Implementer perspective

78. The UNTP includes three data schema and a data discovery mechanism. Each implementer MUST at a minimum publish a digital product passport (DPP) with each shipment of goods or with each uniquely identified item in a shipment and MAY also link conformity credentials and traceability events to the DPP. The issuing of a DPP is done by the supply chain actor—not any centralised system or platform. The DPP MUST always be discoverable from the product identifier using a digital link standard:

- The UNTP Digital Product Passport (UN/DPP) is designed to carry sustainability data about each goods shipment at each step of the value chain. The UN/DPP provides a mechanism for suppliers to differentiate their products based on verifiable data including sustainability performance and allows buyers to meet corporate disclosure requirements;
- The UNTP also includes digital product conformity credentials that provide second-party or third-party attestations to the claims made in the UN/DPP. This is designed to add auditable trust to some of the claims in UN/DPPs (including sustainability claims). In addition, proof of identity credentials (of products, facilities and business entities) reduce identity fraud and counterfeiting. These anti-greenwashing measures prevent fraudulent claims, thereby maintaining the value of UN/DPP data and facilitating compliance with due diligence obligations;
- The UNTP defines a scalable and durable mechanism for exchange of product sustainability data which ensures that the UN/DPP and linked conformity credentials are always discoverable from product and entity identifiers—if you have the goods then you can get the data about the goods. With this mechanism the data is accessible even when goods pass through multiple intermediaries and over any length of time (for example by recyclers after years of market use);
- All data that is discovered from scanning product identifiers is both human and machine readable so that the publisher of the data need not consider the technical maturity of the data consumer; and
- Missing supply chain data either due to low digital maturity of supply chain actors, missing incentives for sharing data and / or supply chain complexity is addressed over time by buyers collaborating with their suppliers. The UNTP model enables data about a product to skip a low digital maturity step by ensuring that if you have the identifier of the product, you can find the UN/DPP about that product. This means that each supply chain actor can implement the UNTP independently of their upstream or downstream value chain partners.

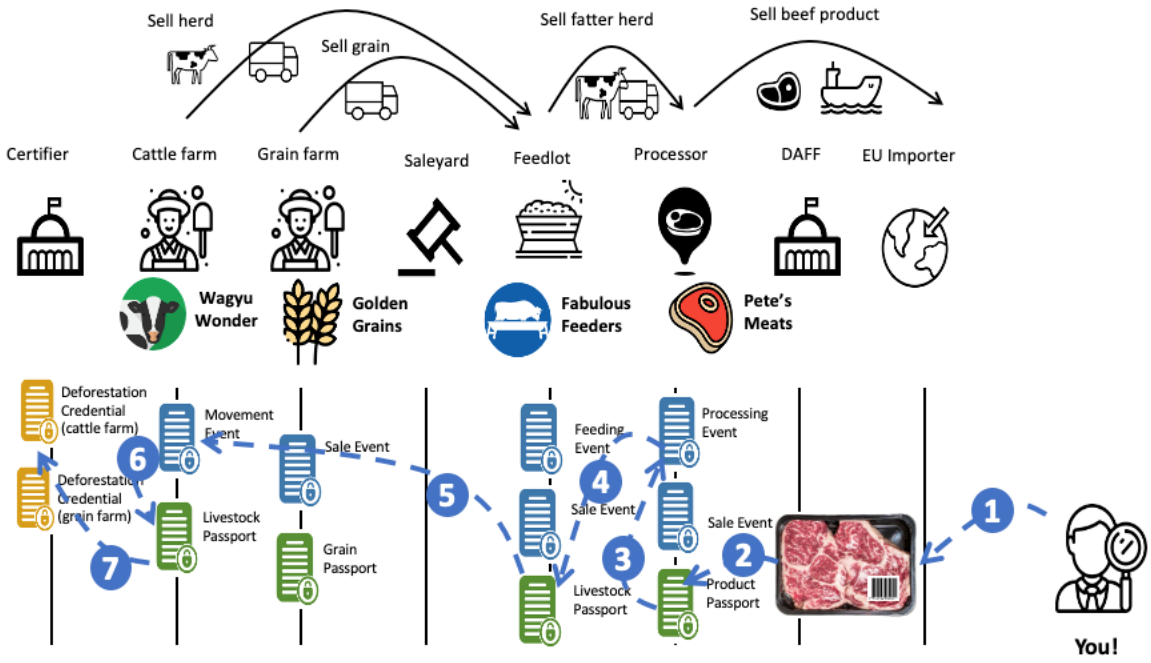


79. The UNTP uses a confidentiality and privacy-preserving model for data sharing that supports end-to-end value chain traceability while allowing each value chain actor to control their own data and to reuse their existing business systems. This includes allowing parties to decide which parts of their sustainability information they wish to share. For example, it is possible to provide proof that suppliers have been certified as having good labour or environmental practices without revealing the name or location of the supplier (information that is often considered to be commercially sensitive—as indicated by the lock icons in the above diagram).

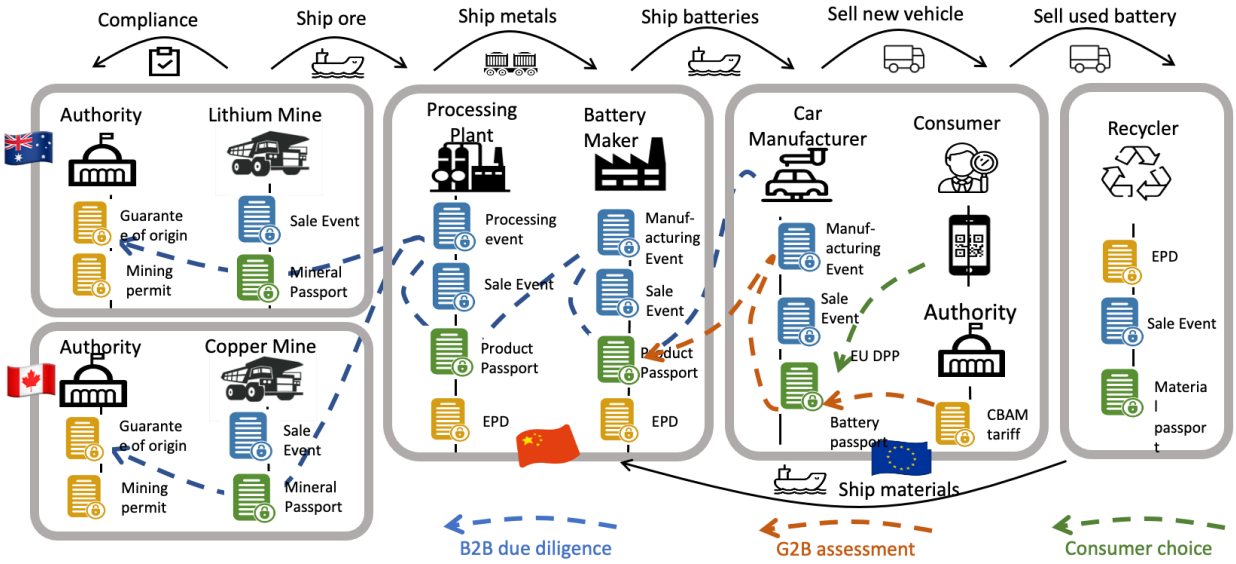
4. Value chain perspective

80. When each actor in a value chain makes their DPP discoverable from product identifiers and optionally adds conformity credential and traceability event links, then it becomes possible to follow a linked data "Transparency Graph" from any entry point (i.e. any product or facility identifier) to discover the traceability and transparency information necessary to support value chain sustainability outcomes, including due diligence and corporate disclosures.

81. In the conceptual example shown below, high integrity transparency data is discoverable from the processor back to farm and forward to the packaged meat on a supermarket shelf.



82. In the following example high integrity transparency data is discoverable from the electric vehicle battery manufacturer back to the mining and refining operations that provided the critical minerals as well as forward to the consumer use and eventual recycling.



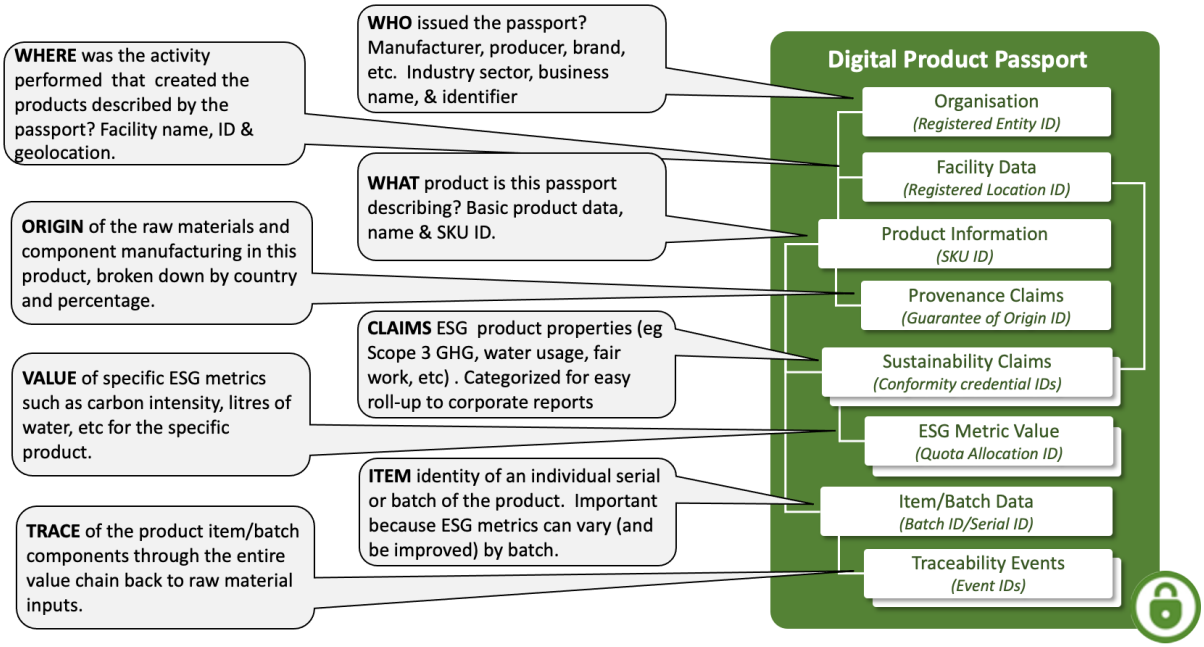
5. UNTP component specifications

83. The UNTP will provide a number of independent technical specifications which are summarized below and detailed on the UNTP website[39].

6. Digital product passport

84. The digital product passport (UN/DPP) is issued by the shipper of goods and is the carrier of product and sustainability information for every serialized product model/serialized item/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 associated with a product. The passport contains links to conformity credentials which add trust to the sustainability 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 UN/DPP does not conflict with national regulations such as the EU DPP. In fact, it can be used as the source of transnational (or international) traceability data and evidence from upstream and/or downstream processes—data and evidence that is needed to issue high-quality digital product passports, or to supplement such passports.

[39] See https://uncefact.github.io/spec-untp/.



7. Product conformity credentials

85. Conformity credentials are usually issued by independent third parties and provide a trusted assessment of product characteristics including sustainability performance against credible standards or regulations[40]. As such, the credential provides trusted verification of the related sustainability claims in the passport. Since a passport may make several independent claims (e.g. emissions intensity, deforestation free, fair work, etc) there may be many linked conformity credentials referenced in 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 sustainability assessments.

8. Traceability events

86. Traceability events are very lightweight 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 information services standard[41] (also ISO/IEC-19987)[42], supported by its companion standard the GS1 Core Business Vocabulary (also ISO/IEC 19988[43]) for this purpose because it is an existing and proven mechanism for value chain traceability. Note that UNTP supports but does not require the use of GS1 identifiers or products. The basic idea behind the traceability event structure is that any value chain of any complexity can always be accurately modelled using a combination of four basic event types:

- An object event describing an action on specific product(s) such as an inspection;
- A transaction event describing the exchange of product(s) between two actors such as a sale of goods between seller and buyer;
- An aggregation event describing the consolidation or de-consolidation of products such as stacking bales of cotton on a pallet for transportation; and

[40] ECE-UN/CEFACT, "White Paper on Digital Product Conformity Certificate Exchange", August 2023, available at https://unece.org/trade/documents/2023/10/white-paper-digital-product-conformity-certificate-exchange.

[41] Available at https://www.gs1.org/standards/epcis.

[42] See also ISO EPC Information Services (EPCIS) Standard at https://www.iso.org/standard/72926.html.

[43] Available at https://www.iso.org/standard/72927.html.

- Finally, a transformation event describing a manufacturing process that consumes input product(s) to create new output product(s).

9. Identity registers

87. Identifiers of businesses (e.g. tax registration numbers and LEIs), of locations (e.g. Google pins or cadastral/lot numbers), and of products (e.g. GS1 GTINs) are ubiquitous throughout value chains. The integrity of identifiers is greatly enhanced when the issuers who control the identifier can be looked up in an authoritative register or verified via some other means. 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 identifier registries and, for those that do not already embody these features, provides a framework to upgrade their registry to meet UNTP requirements. Identifiers used in UNTP implementations should be:

- Discoverable (i.e. easily read by scanning a barcode, QR code, or RFID tag);
- Globally unique (e.g. by adding a domain prefix in accordance with ISO/IEC 15459[44]);
- Resolvable (i.e. given the existence an identifier, there is a standard way to find more data about the identified thing); and
- Verifiable (i.e. ownership of the identifier can be verified so that actors cannot make claims about identifiers they do not own).

88. Within UNTP, the resolvability of identifiers is based on ISO/IEC-18975[45] and the verifiability is based on W3C verifiable credentials. A leading example of an identity register that meets UNTP criteria is the GS1 Registry Platform. The licensees for all GS1 identifiers, and a significant number of GS1 GTINs are discoverable as a B2B data exchange. When encoded as barcodes, GS1's globally unique identifiers are resolvable through GS1 Digital Link[46] which is conformant with ISO/IEC-18975. In some cases, GTINs are further verifiable through a VC that proves GTIN ownership. The Global Legal Entity Identifier Foundation (GLEIF)[47] vLEI is another example of an identifier that is discoverable, resolvable and verifiable.

10. Vocabularies

89. Web vocabularies are a means to bring consistent understanding of meaning to sustainability claims and assessments throughout the transparent value chains, based on UNTP. There are hundreds of sustainability standards and regulations around the world, each with dozens or hundreds of specific conformity criteria. Any given value chain that goes from raw materials to finished product is likely to include dozens of passports and conformity credentials issued against any of thousands of sustainability criteria. Without a consistent means to make sense of this data, the collection of digital product passports and conformity credentials that represent a value chain would be challenging to understand. The UNTP defines a standard and extendable topic map (taxonomy) of sustainability criteria and provides a mechanism for any standards authority, or national regulator, or industry association to map their specific terminology to the UNTP vocabulary. The taxonomy is aligned with IFRS sustainability standards[48] so that it is relatively easy to aggregate claims

[44] ISO/IEC 15459 is a series of 6 standards that underpin many identification schemes, including GS1, DUNS (for business entities), VIN (for vehicles), BIC (for containers) and more.

[45] See ISO/IEC-18975 "Automatic identification and data capture techniques: Encoding and resolving identifiers over HTTP", available at https://www.iso.org/standard/85540.html (under development).

[46] See the GS1 Data Link Standard at https://ref.gs1.org/standards/digital-link/uri-syntax/ and the GS1 Conformant Resolver Standard at https://ref.gs1.org/standards/resolver/.

[47] The GLEIF website is available at https://www.gleif.org/.

[48] IFRS Sustainability Standards Navigator, available athttps://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/.

in digital product passports (such as carbon intensity) in order to meet corporate disclosure requirements.

11. Verifiable credentials

90. The World Wide Web Consortium (W3C) has defined a standard called the Verifiable Credentials (VC) Data Model[49]. A VC is a portable digital version of everyday credentials like education certificates, permits, licences, registrations, etc. VCs are digitally signed by the issuing party and are tamper proof, privacy preserving, revokable and digitally verifiable. The United Nations has previously assessed this standard and has recommended its use for a variety of cross-border trade use cases in a recent white paper[50]. VCs are inherently decentralized and are therefore 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[51] (DIDs) provides a mechanism to manage the cryptographic keys used by VCs and also to link multiple credentials into verifiable Transparency Graph (i.e. linked chains of data allowing the user to evaluate the data's trustworthiness). DIDs are not the same as the business/product/location identifiers maintained by authoritative agencies, but they can be linked to them.

12. Data carriers

91. Digital data needs to be linked to the physical product it describes and should be discoverable through the identifiers that already exist for the products at each step in the supply chain; for example the identifiers printed on a product model, serialized item or batch. For high-volume goods and easy/reliable discovery, these identifiers already exist, usually in the form of 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 sustainability data about that product even when the identifier is not a web link. Therefore, the UNTP recommends the use of ISO/IEC-18975 to allow any identifier scheme to be consistently resolvable so that digital product passports and other data can always be accessed from the identifier of the product. The UNTP also defines a specific QR code-based data carrier format for use on paper/PDF versions of conformity credentials or other trade documents. This 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.

13. Trust anchors

92. UNTP credentials include identifiers of products, locations or businesses. UNTP credentials also include sustainability performance claims like emissions intensity values. But how can a verifier of these identifiers or sustainability 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 conformity assessment bodies (certifiers) to issue third-party conformity assessment attestations. UNTP depends on trust anchors to add digital integrity to sustainability claims and identities by linking them to the authority, or other recognized entity, under which these

[49] The W3C VC Data Model v.1.1 is available at https://www.w3.org/TR/vc-data-model.

[50] See the ECE "White Paper on eDATA Verifiable Credentials for Cross Border Trade", 20 October 2023, available at https://unece.org/trade/documents/2023/10/white-paper-edata-verifiable-credentials-cross-border-trade.

[51] The W3C Decentralized Identifiers (DIDs) v.1.0 standard is available at https://www.w3.org/TR/did-core.

credentials were issued. In essence, UNTP defines a protocol for existing trust anchors to continue doing what they have always done, but in a digitally verifiable way.

14. Transparency graphs

93. The sustainability footprint of a finished product is the aggregation of the footprints of all the transformations of the product that took place during the product life cycle in the value chain that went into making that product. Verification of sustainability claims therefore involves assessing a bundle of linked credentials (aka a "Transparency Graph") drawn from all or part of a value chain. While each credential may be valid individually, one challenge is verifying the context of related credentials. For example, a conformity assessment body that is accredited to test the 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 for a conformity assessment body 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. This provides a mechanism to verify linked data without analysing the content of the data.

15. Confidentiality

94. There is a balance between the demands of transparency (more value chain visibility means it is harder to hide greenwashing) and confidentiality (share too much data and you risk exposing commercial secrets). Different parties have different appetite for what they want to share and so, subject to minimum data requirements, it's up to each actor to choose what they share above the minimum. A key UNTP principle is that every value 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 (remove) data from credentials received from upstream suppliers before passing them on to downstream buyers - without affecting the cryptographic integrity of the data.

16. Anti-counterfeiting

95. As the value of genuinely sustainable products increases, so do the incentives to sell fake products as the real thing. UNTP defines a simple and decentralized anti-counterfeiting protocol that can be implemented by any actor at extremely low cost. It builds upon the W3C DID standard by issuing a unique public and private set of cryptographic keys for every serialized (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 private key is discoverable from a QR code hidden inside the product packaging. Scanning the QR provides the necessary key to update the individual serialized product or batch public status to indicate consumption. Attackers that copy genuine serial numbers will find that their products or batches 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 (model). The UNTP anti-counterfeiting protocol provides additional value/incentive for UNTP uptake beyond sustainability integrity.

17. Mass balance fraud

96. Mass balance fraud is a particularly challenging greenwashing vector. It happens when a fraudulent actor buys a small quantity of inputs with a high level of sustainability inputs (e.g. genuine carbon neutral, organic, deforestation free cotton) and mixes that with inputs having a lower level of sustainability and then sells the full volume of manufactured product (e.g. woven cotton fabric) as a sustainable product, reusing the valid credentials from the minority sustainable input. The UNTP solution to this problem involves trusted third parties (certifiers or industry associations) who function 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 of sustainable input materials. The third party will also mark the input batch as consumed (in a comparable way to the anti-counterfeiting protocol) so that the valid sustainable input cannot be presented again to a different third party.

18. Sustainability rules

97. Deliberately applying incorrect rules to the determination of criteria is another way that supply chain actors can commit fraud. The verification question of “were the sustainability criteria applied correctly" is an important question to answer. 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 value 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, it becomes relatively simple to test compliance against multiple standards and regulations.

D. United Nations Transparency Protocol governance

1. Success measures

98. Although improved sustainability and reduced greenwashing are the ultimate goals of UNTP, the most direct measure of success is uptake of the standard by implementers. 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). These measures will be tracked on the UNTP website. For UNTP to achieve its goals, uptake will need to reach tens of thousands of implementations across various value chain actors (producers, manufacturers, regulators, certifiers, software developers, etc.).

2. Protocol governance

99. The UNTP development follows the same standard governance rules[52] as any UN/CEFACT project—meaning it is:

- Open source, licenced and free to use;
- Maintained via an open and collaborative consensus-based process; and
- Version controlled and life cycle managed.

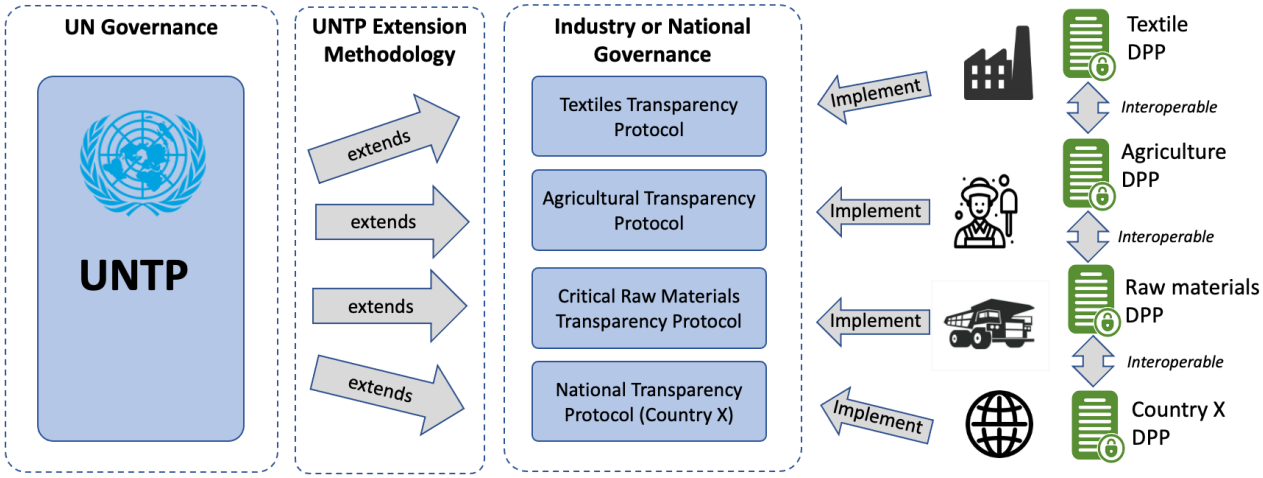
100. The latest stable version of UNTP will always be shown by default at the UNTP website. In-progress future versions and previous versions will also be accessible. The version history includes major versions (breaking) and minor versions (non-breaking but with functional change) but not patch versions (bug fixes and typos).

101. Maintenance team meetings are open to any UN/CEFACT registered expert.

[52] UN/CEFACT Governance webpage, available at https://github.com/uncefact/governance?tab=readme-ov-file#governance.

3. National or industry extensions

102. UNTP is designed as a common core that is usable by any industry sector or in any regulatory field and jurisdiction. An extensions methodology[53] 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.



4. Implementation testing

103. Interoperability between different UNTP implementations is a fundamental requirement. Digital product passports issued by one implementer should be readable and verifiable by another. For any implementer to have sufficient confidence that their implementation will be interoperable, they must complete rigorous interoperability testing.

104. The UNTP website includes a test suite and test tools that can be used by any implementer to self-assess their conformance to the UNTP standard. There is a test suite for each version of the UNTP. Note that, by definition, minor versions are backwards compatible (so a v2.1 implementation will interoperate with a v2.2 implementation) while major versions are not compatible (a v3.x implementation will not be interoperable with a v2.x implementation). Implementers are expected to test each major version of their software against each major version of the UNTP that they wish to support.

105. Industry or jurisdictional extensions of UNTP will also need to provide conformance testing capability to support implementers of the extension. Such tests will normally cover industry-specific vocabularies (language) and choreographies (processes). UNTP provides best practice guidance and examples that show how to extend core UNTP tests to cover the requirements of UNTP extensions.

E. Circularity

106. Circularity is an economic model that aims to minimize environmental impact by reducing waste and maximizing reuse. A useful conceptual reference is the “9R framework” (*refuse*, *rethink*, *reduce*, *reuse*, *repair*, *refurbish*, *remanufacture*, *repurpose*, *recycle and recover*)[54].

[53] The UNTP Extensions Methodology webpage is currently under development, and will be available at https://uncefact.github.io/spec-untp/docs/extensions/ExtensionsMethodology.

[54] As outlined in the European Commission publication "Categorization System for the Circular Economy", March 2020, available at “https://circulareconomy.europa.eu/platform/sites/default/files/categorisation_system_for_the_ce.pdf.

107. Data standardization work in support of circularity is already under way:

- UN/CEFACT product circularity data use case;[55] and
- ISO-59040 product circularity data sheet.[56]

108. The UNTP will not duplicate existing work but rather will work to ensure alignment by specifying standardized language for circularity criteria for use in United Nations Digital Product Passports[57] and in United Nations Digital Product Conformity Credentials[58]. The UNTP sustainability vocabulary[59] will align with existing United Nations and ISO standards for product circularity claims.

F. Inclusiveness

109. As consumer and regulator demand for digital and verifiable product sustainability evidence increases there is a risk of imposing unequal compliance burdens. Small businesses, developing nations or those with low digital maturity may produce highly sustainable products but may be less able to prove it, and this may result in unfair competition or even market exclusion. This recommendation and the supporting UNTP guidelines consider inclusiveness as a basic design principle.

110. An advantage of claims being expressed digitally is that they can be easily made available in multiple languages, on large and small screens, and follow W3C Web Content Accessibility Guidelines (WCAG)[60] to maximize readability/perception among people with disabilities.

1. Digital divide

111. This recommendation recognizes that paper processes are ubiquitous in value chains and that each organization (whether large or small) will progress on their digitalization journey at a different pace. The UNTP is designed to accommodate varying digital maturity levels.

112. Issuers of digital product passports and digital product conformity credentials must always include a human-readable rendering of the digital credentials so that digitally underserved consumers of the data can access the information. This can be achieved by including a rendering template within the digital credential so that the same credential can be easily read by either humans or machines. This capability also simplifies life for the digitally mature issuer because they do not need to do anything different for consumers with different digital maturities.

2. Low and middle-income countries

113. The recommendation recognizes that low and middle-income countries may not have the same maturity as high-income countries in terms of national infrastructure and governance processes. For example, national digital identity frameworks may not be in place. There may not be a well-established and competitive ecosystem of accredited conformity

[55] See the new UN/CEFACT "Product Circularity Data Use Case", which will be added to the *Business Requirements Specification for Traceability and Transparency in the Textile and Leather Sector, Part 2*: https://unece.org/sites/default/files/2024-04/BRS-ProductCircularityDataUseCase_v1.0-Ext-TL_TT_BRS_Part%20II-UC_CCBDA.pdf

[56] See the ISO Product Circularity data sheet, available at https://www.iso.org/standard/82339.html.

[57] See UNTP webpage on DDPs at https://uncefact.github.io/spec-untp/docs/specification/DigitalProductPassport (webpage under development).

[58] See UNTP specifications webpage on conformity credentials at https://uncefact.github.io/spec-untp/docs/specification/ConformityCredential (webpage under development).

[59] See UNTP specifications webpage on vocabularies at https://uncefact.github.io/spec-untp/docs/specification/Vocabularies (webpage under development).

[60] See https://www.w3.org/WAI/standards-guidelines/wcag/.

assessment bodies. Business registers and/or land registers may be incomplete and may not be digitally accessible. The UNTP is designed to accommodate varying national capabilities:

3. Micro, small and medium-sized enterprises

114. Micro, small and medium-sized enterprises (MSMEs) normally have much less capacity for digital investment and much less market power to influence other value chain actors. They will also have significantly lower sales volumes over which to spread fixed compliance cost such as facility audits. The UNTP is designed to accommodate MSME needs:

- Most MSMEs use some kind of off-the-shelf software to run their business. As a digital standard (not a technology platform), the UNTP can be implemented by MSME software providers. This will release the MSME from the costs and complexities of having to use multiple traceability and transparency systems imposed by various large buyers; and
- Many MSMEs are members of a relevant industry association. There is an opportunity for industry associations to aggregate buying power and assessment coverage for sustainability audits, providing smaller members with access to high integrity conformity assessments at affordable prices.

Annex

Glossary of terms

Acronym or term	*Definition*
CBAM	Carbon Border Adjustment Mechanism
DID	Decentralized Identifier
DCC	Digital Conformity Certificate
DPP	Digital Product Passport
EC	European Commission
EPCIS	Electronic Product Code Information Services
ESG	Environmental, Social and Governance
ESRS	European Sustainability Reporting Standard
EUDR	European Deforestation Regulation
GLEIF	Global Legal Entity Identifier Foundation
GS1	https://www.gs1.org/ - an organization providing an international product registry, barcoding and other digital standards
GTIN	Global Trade Item Number
Guarantee of origin (GO)	A credential issued by a trusted authority or their accredited delegate that attests to the origin (provenance) of a product as well as to some, or all, of the sustainability claims. The GO certificate is typically issued by export authorities to add confidence to the claims made by exporters.
IFRS	International Financial Reporting Standard
IRA	Inflation Reduction Act (USA)
ISO	International Standards Organisation
ISSB	International Sustainability Standards Board
LEI and vLEI	Legal Entity Identifier (LEI) and it’s digitally verifiable version (vLEI).

Acronym or term	*Definition*
MSME	Micro, Small and Medium-sized Enterprise
QR	Quick Response code
RFID	Radio Frequency Identification
SDG(s)	United Nations Sustainable Development Goal(s)
UNECE	United Nations Economic Commission for Europe
UNTP	United Nations Transparency Protocol
VC	Verifiable Credential
W3C	World Wide Web Consortium