United Nations ECE/TRADE/C/CEFACT/2025/3

Economic and Social Council

Distr.: General
24 April 2025

Original: English

Economic Commission for Europe

Executive Committee

Centre for Trade Facilitation and Electronic Business

Thirty-first session
Geneva, 3 July (pm) and 4 July (am) 2025
Item 3 of the provisional agenda
Progress on the United Nations Economic Commission for Europe policy recommendations

Recommendation No. 49: Transparency at Scale – Fostering Sustainable Value Chains

Submitted by the Bureau

Summary

In May 2023, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) launched the project titled "Transparency at scale – Digital solutions for trust, resilience and sustainability". Among the deliverables of this project is Recommendation No. 49: Transparency at Scale – Fostering Sustainable Value Chains, which offers policy guidance to global, regional and national policy makers on principles for action and supporting instruments.

Recommendation No. 49 was developed in response to growing demand for policy action that ensures the integrity of both product sustainability claims and corporate sustainability disclosures. The draft completed its first 60-day public review on 19 June 2024 and was subsequently presented to the thirtieth Plenary of UN/CEFACT for information and discussion. Following the integration of comments received, consultations and a second 30-day public review were conducted, concluding on 23 March 2025. The revised document, submitted to the thirty-first session of the UN/CEFACT Plenary for decision, incorporates feedback from this second round of consultations and public review.

Document ECE/TRADE/C/CEFACT/2025/3 is submitted by the Bureau to the thirty-first session of the UN/CEFACT Plenary for decision.

Part I

Recommendation No. 49: Transparency at Scale – Fostering Sustainable Value Chains

I. Introduction

1. Recommendation No. 49 was developed in response to an increasing demand for policy action to leverage and enhance the trust in sustainability information.[1] Given the international nature of value chains, the recommendation aims to make sustainability information accessible across different jurisdictions, industries, product segments, and steps in the value chain, thereby enabling transparency at scale. Its development was motivated by the practical challenges[2] that United Nations (UN) Member States face in advancing implementation of the Sustainable Development Goal (SDG) 12 of the UN 2030 Agenda for ensuring sustainable consumption and production patterns through traceability in value chains. The challenges are particularly acute for target 12.6, which encourages companies to adopt sustainable practices and sustainability disclosures, and target 12.8, which promotes universal understanding of sustainable lifestyles.

2. The development of this recommendation was mandated by the United Nations Economic Commission for Europe (ECE) member States to contribute to ECE's cross-cutting themes focusing on advancing the circular and digital transformations for sustainable development.[3] These themes reflect a growing consensus among governments and industries on the importance of responsible, equitable and interoperable data governance. Such governance is essential for achieving development objectives, safeguarding human rights, fostering innovation and driving economic growth, as outlined in Objective 4 of the Global Digital Compact, annexed to the UN Pact for the Future.[4]

3. The measures and approaches recommended here seek to align with relevant international and regional policies and legal instruments, including, but not limited to: the UN Guiding Principles on Business and Human Rights;[5] the International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work[6] as well as other relevant ILO Conventions and Recommendations, such as the ILO Tripartite

[1] See e.g. United Nations Environment Programme (UNEP), Global Environment Data Strategy. Available at https://www.unep.org/topics/digital-transformations/global-environmental-data-strategy-geds; European Union (EU) Corporate Sustainability Due Diligence Directive; EU Ecodesign for Sustainable Products Regulation; EU Green Claims Directive; Netherlands Authority for Consumers and Markets; UN Global Compact "A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains;" UNEP "Regulatory Frameworks to Combat Greenwashing;" UN Secretary General report "Resourcing the Energy Transition;" United States Environmental Protection Agency, Scientific Integrity Policy.

[2] Specifically, these difficulties relate to providing assistance in implementing at scale Recommendation No. 46: Enhancing Traceability and Transparency of Sustainable Value Chains in the Garment and Footwear Sector, Geneva, 2022. Available at https://unece.org/sites/default/files/2023-10/Rec46-ECE-TRADE-463E.pdf.

[3] This mandate is outlined in the UN/CEFACT Programme of Work for 2023-2024 (ECE/TRADE/C/CEFACT/2022/21/Rev.1): and 2025-2026 (ECE/TRADE/C/CEFACT/2024/7).

[4] United Nations, Pact for the Future, Global Digital Compact and Declaration on Future Generations, (September 2024). Available at Pact for the Future, Global Digital Compact and Declaration on Future Generations.

[5] United Nations Human Rights Office of the High Commissioner, Guiding Principles on Business and Human Rights, HR/PUB/11/04 (2011). Available at https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf.

[6] International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work. Available at https://www.ilo.org/about-ilo/mission-and-impact-ilo/ilo-declaration-fundamental-principles-and-rights-work.

Declaration on Principles concerning Multinational Enterprises and Social Policy;[7] the Paris Agreement on Climate Change;[8] the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);[9] the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises;[10] the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector;[11] the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Area;[12]the OECD/Food and Agriculture Organization (FAO) Guidance for Responsible Agricultural Supply Chains;[13] the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal;[14] and the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention).[15]

4. This recommendation provides guidance for global, regional and national policy makers on principles for action and supporting instruments to achieve transparency at scale for sustainable value chains.

5. The objectives are as follows:

(a) To strengthen national economies and promote international sustainable trade through greater transparency, where transparency can be achieved by trustworthy product sustainability claims and corporate sustainability disclosures, supported by value chain traceability;

(b) To advance responsible business conduct by facilitating risk-based due diligence to address environmental, human rights and social impacts in global value chains;

(c) To create a level playing field for compliant actors operating along the value chain;

(d) To improve access to export markets and boost the competitiveness of domestically produced products in response to growing sustainability concerns; and

(e) To reduce the complexity, time and cost associated with data exchange when validating whether products conform with sustainability standards or requirements;

(f) The recommendation can also serve as a reference for other stakeholders committed to advancing sustainable consumption and production patterns (SDG12), and

---

[7] ILO, Tripartite Declaration on Principles concerning Multinational Enterprises and Social Policy. Available at https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_emp/%40emp_ent/%40multi/documents/publication/wcms_094386.pdf.

[8] Paris Agreement. Available at https://unfccc.int/sites/default/files/english_paris_agreement.pdf; See also https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40ed_emp/%40emp_ent/%40multi/documents/publication/wcms_094386.pdf .

[9] Convention on Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Available at https://cites.org/eng/disc/text.php.

[10] Organisation for Economic Cooperation and Development (OECD), Guidelines for Multinational Enterprises on Responsible Business Conduct (2023). Available at https://doi.org/10.1787/81f92357-en.

[11] OECD, Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector (2018). Available at https://doi.org/10.1787/9789264290587-en.

[12] See OECD , Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (2016). Available at https://www.oecd.org/en/publications/oecd-due-diligence-guidance-for-responsible-supply-chains-of-minerals-from-conflict-affected-and-high-risk-areas_9789264252479-en.html.

[13] OECD/Food and Agriculture Organization (FAO), Guidance for Responsible Agricultural Supply Chains (2016). Available at https://doi.org/10.1787/9789264251052-en).

[14] UNEP, Basel Convention on the Control of Transboundary Movements of Hazardous wastes and their Disposal (revised 2023) Available at https://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx.

[15] United Nations Economic Commission for Europe (ECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1998). Available at https://unece.org/DAM/env/pp/documents/cep43e.pdf .

other relevant goals of the 2030 Agenda, from upstream production and manufacturing to the consumption and disposal of end-of-life products and/or recovery of materials.

A. Purpose

6. The primary purpose of Recommendation No. 49 is to support national and regional policy makers in demonstrating the improved sustainability of their economies — spanning production, purchase, consumption, reuse, recycling and disposal operations.

7. For sustainability to become a competitive advantage and a key-decision factor in the modern economy, it is essential that sustainability information — encompassing both product sustainability claims and corporate sustainability disclosures — be trustworthy. Establishing trust can trigger a virtuous cycle, where companies invest in sustainability solutions to secure premium returns, which in turn fuels further investments in sustainability.

1. Meeting requirements for trustworthy sustainability information

8. To establish trust in sustainability information, the following requirements should be met:

(a) High Quality: It should be accurate, complete, and assured (often referred to as data assurance or accuracy);

(b) Verifiable: It should be verifiable (as outlined in Part I, Chapter C, Section 1);

(c) Interoperable: It should adhere to regional and international standards, ensuring compatibility across systems;

(d) Accessible: It should be easily discoverable (e.g. in Digital Product Passports (DPPs)), always available, human readable, and affordable;

(e) Privacy-Preserving: It should not violate any actor's privacy or endanger business confidentiality;

(f) Digitized: It should be available in an electronic format to reduce complexity, cost, and time involved in its exchange;

(g) Understandable: The vocabulary used should be clear, simple and easy to understand, so to make products, services, and companies comparable; and

(h) Self-sovereign: The owner should manage and control the sustainability information.

9. Ensuring that claims and disclosures meet these requirements is essential to accurately track progress against sustainability targets and reward effective sustainability practices.

2. Supporting value chain participants

10. This recommendation also seeks to support value chain participants, particularly small and medium-sized enterprises (SMEs), by reducing the costs and complexity involved in exchanging sustainability information. It aims to facilitate their ability to meet both voluntary and mandatory sustainability disclosure requirements, while also improving the monitoring of non-market actors and their impact on value chains through better provenance and transparency of such information.

11. Transparency at scale is key to achieving this goal. This includes ensuring transparency regarding sustainability across global value chains — from the sourcing of raw materials (whether virgin or recycled) through to manufacturing, use, reuse, and eventual end-of-life processing. This also includes the recovery and reintegration of materials into new or existing value chains.

3. Addressing challenges for SMEs and global markets

12. Many national and regional policymakers in middle- and high-income countries have recognized the need for value chain transparency to meet sustainability goals and are

beginning to establish related legislative and regulatory frameworks. However, the patchwork of sustainability requirements,[16] combined with the costs of multiple conformity processes and systems, risks excluding SMEs and businesses in low-income countries from participating fully in global markets.

13. Therefore, another purpose of this recommendation is to reduce the compliance burden associated with transparency at scale. This can be achieved by lowering the costs and complexity of sustainability information exchange, thus enabling businesses, especially SMEs, to comply with sustainability disclosure requirements more easily. It also aims to facilitate the monitoring of non-market actors and their intervention in value chains, by improving the provenance and transparency of such information.

14. The above is accomplished by identifying the digital capacities needed for accountability and governance at scale and through access to implementation guidance and supporting instruments that provide those capacities.

4. Envisioning a future of transparency and accountability

15. Recommendation No. 49 envisions a profound shift in how organizations communicate their sustainability commitments and their production practices. This shift will lay the groundwork for a possible future marked by enhanced transparency, accountability, and trust.

16. Central to this vision is the widespread adoption of DPPs, which provide reliable and verifiable sustainability information conveyed through clear and standardized terminology. These passports are intended to be readily accessible to consumers, supply chain actors, and regulatory authorities. Leveraging innovations such as digital identity wallets, access to non-public DPP data can be securely enabled without reliance on centralized governance systems.

17. In this vision, regulatory compliance processes are digitalized, with all relevant documentation, including due diligence certificates, integrated into the product's digital profile. And stakeholders, which include among others customers, public authorities and recyclers, can verify a product's sustainability attributes instantly, ensuring informed decision-making and reinforcing accountability throughout the product lifecycle.

18. As part of this envisaged future, trusted sustainability information enhances understanding of environmental pressures, fosters stronger connections between environmental, social, and economic data ecosystems, and supports a more holistic approach to addressing complex sustainability challenges.

B. Scope

19. Recommendation No. 49 focuses on enhancing the exchange, accessibility, and trustworthiness of product sustainability information across global value chains.

20. Its scope includes the following key areas:

Table 1
Scope of Recommendation No. 49 and its supporting instruments

In scope	*Description*
Exchange of product sustainability information	Facilitating the exchange of sustainability information at all stages of a product's life cycle — including raw materials, parts, components, sub-assemblies, final products, reused and recycled products, and packaging. Information should be shared with those who have the right to know.

[16] For further reading on this subject, see Krueger, Philipp, Zacharias Sautner, Dragon Y Tang, and Rui Zhong, The Effects of Mandatory ESG Disclosure around the World, OSF (8 September 2024). Available at https://www.zora.uzh.ch/id/eprint/263803/.

In scope	*Description*
Transparency at scale	Having sustainability information accessible across different jurisdictions, industries, product segments, and steps in the value chain to reach voluntary or regulatory sustainability objectives while safeguarding business confidentiality.
Value chain traceability	Supporting the tracking and tracing of products, components, and processes across value chains to improve transparency and accountability.
Trust in sustainability information	Enhancing the reliability of sustainability claims (at the product level) and disclosures (at the company level). This includes the possibility of using digitally verifiable documents, issued by recognized authorities, as formal declarations of compliance, sustainability, or product characteristics. This would also involve trustworthy actors such as government bodies and accredited conformity assessment organizations.
Data Sovereignty	Ensuring that product, facility, and company information remains under the control of the value chain actors who are the owners of this information.
Ad-hoc data discovery	Facilitating the ad-hoc discovery of relevant sustainability information for both products and companies.
Common core data model	Defining a common core data model, which can reference the vocabularies and requirements of sustainability claims or disclosures that are published by the scheme owner or regulator.
Circular economy model	Supporting a current sustainable economic model, in which products and materials are designed in such a way that they can be reused, remanufactured, recycled or recovered and thus maintained in the economy for as long as possible, along with the resources of which they are made. In such a model generation of waste, especially hazardous waste, is avoided or minimized, and greenhouse gas emissions are prevented or reduced.[17]

21. Table 1 illustrates the scope of Recommendation No. 49, which advocates for building supporting instruments that enable the issuance, discovery, and exchange of sustainability information by different actors in the value chain. This supports both circular economy principles and sustainable consumption and production practices.

22. Not all actors in the ecosystem can currently provide sustainability information, but this capability is expected to grow over time. Actors involved include the following:

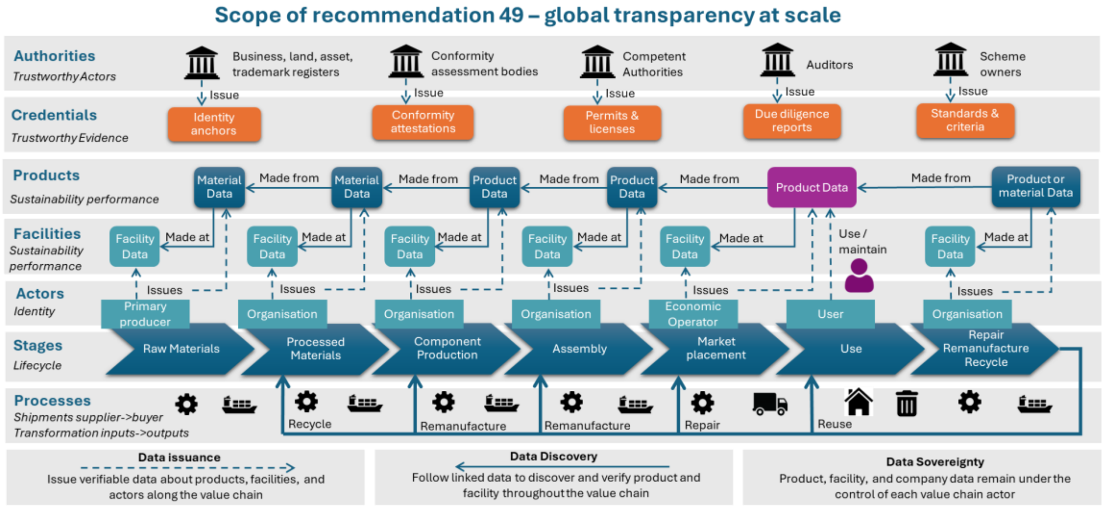
(a) Trusted authorities (e.g. governments, auditors) who issue credentials such as operating permits, due diligence reports, or Authorized Economic Operator (AEO) certificates;

(b) Value chain actors who generate or hold company disclosures and product claims, including traceability data; and

(c) End-users of DPPs such as consumers making informed choices or recyclers accessing material composition at a product's end-of-life.

[17] See UNEP, "Circular Economy" definition. Available at Circular economy | UNEP Law and Environment Assistance Platform.

Figure 1
Scope of Recommendation No. 49 and its supporting instruments



Source: ECE, 2025

23. Because this recommendation is industry sector and technology agnostic, the following aspects are outside its scope and the scope of its supporting instruments:

Table 2
Aspects outside the scope of Recommendation No. 49 and its supporting instruments

Out of scope	*Description*
Data carriers	The recommendation is technology-agnostic regarding physical data carriers (e.g. Quick Response (QR) codes and Radio Frequency Identification (RFID) tags). It does not specify how sustainability information should be encoded or accessed via such carriers.
Hardware development	The design or production of physical devices is not addressed.
Software development	While core definitions and verification of open-source implementations related to supporting instruments may be included, general software development is outside the scope.
Data backup and storage	Storage solutions for value chain or product data are not part of this recommendation.
Vocabularies and sector-specific requirements	International, regional, cross-sector, or industry-specific terminologies and regulatory requirements will continue to be defined by relevant authorities (e.g. standards bodies, policymakers, or industry groups). For example, the EU Battery Passport attributes were defined by the Battery Pass research consortium, involving key industry stakeholders. Within the scope of this recommendation is the definition of a common core data model, which can reference and align with such external vocabularies and regulatory requirements.

C. Benefits

1. Direct benefits

24. The implementation of Recommendation No. 49 and its supporting instruments by national and regional policy makers worldwide can directly benefit multiple value chain

actors in industry sectors that are critical for the green and digital transformations. It can do this by increasing the availability of sustainability information to drive responsible and sustainable decision-making.

25. Main beneficiaries include, but are not limited to, authorities that increasingly require trustworthy sustainability information (e.g. border control and market surveillance agencies), manufacturers, retailers, logistics companies, auditors, consumers, recyclers, repairers, sorters, refurbishes, and other stakeholders who rely on trustworthy product information.

26. Implementation of this recommendation and its supporting instruments can directly benefit such actors in the following ways:

Table 3
Direct benefits

Direct benefit	*Description*
Share trustworthy sustainability information	Enables stakeholders to share sustainability data that meets quality and credibility criteria (as defined in Part I, Chapter 2), enhancing overall trust in sustainability communications.
Increase verifiability of claims and disclosures:	Enhances the credibility of sustainability information through multiple verification mechanisms. These mechanisms serve to enhance trust among supply chain actors by ensuring that claims are substantiated with reliable and verifiable evidence. This includes verification of the integrity, provenance, and legitimacy of both the claims and the entities making or supporting them: • any assessments, such as certification, used to support a claim are conducted by parties holding appropriate authorization and accreditation. For example, certification bodies may be accredited by a national accreditation body to issue certificates covering the specific conformity assessment schemes listed within the scope of the accreditation. • any certificates provided in support of claims can be reliably linked to the product of interest and have not been altered after issuance.
Streamline reporting efforts	Digitizes sustainability information, streamlining the compliance and reporting processes.
Ensure data sovereignty	Provides value chain actors with control over the information they share, protecting privacy and safeguarding sensitive business data.

2. Indirect benefits

27. Implementing the recommendation and its supporting instruments has also the potential to bring a range of indirect benefits, as detailed in Table 4 below.

28. Overall, by enabling transparent and verifiable sustainability information, it fosters more efficient, sustainable, and accountable value chains.

Table 4
Indirect benefits

Indirect benefit	*Description*
Consumer trust	Enables informed choices through transparent, traceable, and verifiable sustainability information.

Indirect benefit	*Description*
Accountability and oversight	Helps detect misleading claims and unsustainable practices; empowers workers, unions, and regulators.
Market access	Facilitates entry into global markets by ensuring data interoperability and adherence to standards.
Trade enforcement	Helps border agencies better identify products that are more sustainable and thus better enforce trade-based policies to promote sustainability.
Product value	Increases the market value of products with credible sustainability credentials.
Risk management	Enhances supply chain transparency and helps mitigate disruptions during economic or global crises.
Finance and insurance access	Improves business credibility, easing access to capital, insurance, and financial services.
Sustainable business practices	Supports the development of and alignment with recognized, competitive sustainability standards.
Non-financial reporting	Simplifies and strengthens the accuracy of sustainability reporting and compliance.
Due diligence enforcement	Enables regulators to verify compliance with sustainability laws through traceable digital data.
Counterfeit detection and recalls	Helps identify fake products and enables targeted, efficient product recalls using lifecycle data.
Innovation and new models	Fosters new business models like product-as-a-service through reliable sustainability information.
Operational efficiency	Speeds up customs, reduces delays, and optimizes logistics with real-time, processable data exchange.

D. International standards

29. The development of supporting instruments for Recommendation No. 49 shall be based on international recommendations and standards, including those from UN/CEFACT, among others.[18] These include ECE Recommendation No. 46,[19] the UN/CEFACT Buy-Ship-Pay Reference Data Model (BSP-RDM),[20] the UN/CEFACT Digital Product Certificate

18 Examples of other relevant international standards include ISO 59040:2025 "Circular economy — Product circularity data sheet (PCDS)" or the International Telecommunication Union (ITU) L.1070 (11/2023), "Global digital sustainable product passport opportunities to achieve a aircular economy." Also to be noted the electronic business memorandum of understanding ebMoU between IEC/ISO/ITU/ ECE, which is an agreement established in 2002 to promote interoperability and harmonization in electronic business standards.

19 ECE, 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/2022-01/ECE-TRADE-463E.pdf.

20 UN/CEFACT, Business Requirements Specification Buy-Ship-Pay Reference Data Model, UN/CEFACT Bureau, August 2019. Available at https://unece.org/fileadmin/DAM/cefact/brs/BuyShipPay_BRS_v1.0.pdf.

Exchange ,[21] and the UN/LOCODE.[22] Such instruments will support the principles outlined in the Guidelines in Part II of this recommendation.

E. Recommendations

30. UN/CEFACT recommends that national and regional policymakers take the actions listed below:

1. Develop a national policy for transparency at scale

31. National and regional policymakers should establish a national transparency framework in a way that aligns with risk-based due diligence for responsible business conduct, to support their national sustainability commitments and improve their export market competitiveness.

32. The policy should prioritize value chains where the largest impact on sustainability can be expected and consider special (financial) support for SMEs and developing countries. For example, this could include policy instruments to help national governments align incentives for sustainable enterprises with transparency standards. Such policy should strike a balance between cost considerations and the logistical complexities of full supply chain traceability, all while striving to enhance overall sustainability. Some high-risk value chains might warrant a more detailed, intensively structured traceability or chain of custody system - for example, due to the risk of fraudulent misrepresentation of the origin of commodities, such as cotton, leather or minerals - while in other cases a community audit system could be considered sufficient.

2. Implement supporting instruments for the national policy on transparency at scale

33. To enable implementation of their national transparency framework and to address the challenges of trust, complexity, scalability, interoperability, confidentiality, costs, and resistance to change in data exchange practices, value chain actors, both private and public, should use supporting instruments.

34. In this context, policy makers, legislators and value chain actors should undertake to implement supporting instruments for transparency at scale that:

(a) Address the implementation challenges outlined in Chapter I of the Guidelines in Part II of this recommendation.

(b) Follow the supporting instrument principles, outlined in Chapter II of the Guidelines in Part II of this recommendation.

35. UN/CEFACT is developing and will be maintaining a supporting instrument for transparency at scale, called the United Nations Transparency Protocol (UNTP,[23] see Annex I). National and regional policymakers can use the UNTP or any other equivalent supporting instrument that addresses the implementation challenges and follows the principles provided in the Guidelines in Part II of this recommendation.

3. Develop government services in support of the national policy for transparency at scale

(a) National and regional policymakers generally define rules, issue permissions, maintain registers of products, assets, facilities and businesses, and manage compliance. This role is enhanced when governments add digital verifiability to their existing regulatory processes. In this way, authorities can become digital "trust anchors". Government entities

---

[21] UN/CEFACT, BRS Digital Product Conformity Certificate Exchange" (July 2024). Available at https://unece.org/sites/default/files/2024-07/BRS-DigitalProductConformityCertificateExchange.pdf.

[22] UN/LOCODE, Code List by Country and Territory (17 January 2025). Available at https://unece.org/trade/cefact/unlocode-code-list-country-and-territory.

[23] ECE, United Nations Transparency Protocol - UNTP *(Note: Final hyperlink is still to be established)*. Available at UN Transparency Protocol | UN Transparency Protocol.

with strong business identity verification processes (e.g. company registers, tax authorities) should issue registration documents that are digitally verifiable;

(b) Authorities, such as departments of agriculture, environment, energy and resources, should issue all permits and certificates as digitally verifiable documents;

(c) Export regulators should consider extending existing export certificate schemes, such as certificates of origin and phytosanitary certificates, to include trusted attestations[24], such as those for carbon intensity;

(d) Land registration authorities should issue geolocated land titles and cadastral boundaries such that are digitally verifiable format;

(e) Relevant authorities, such as customs authorities and market surveillance authorities, should leverage the increased availability of digitally verifiable market data like product passports that accompany imported goods to improve and automate compliance outcomes (e.g. sustainability controls at borders); and

(f) Governments should authorize trusted organizations, such as government agencies, accredited conformity assessment bodies, notified bodies and other trusted entities to issue certificates and IDs in a digitally verifiable format. This can establish a trust chain between the receiver of a trusted attestation and the government.

4. Promote the uptake of the national policy for transparency at scale

36. National and regional policymakers should:

(a) Engage their technical and business experts to participate in the development and maintenance of supporting instruments for Recommendation No. 49 and start building capacity to use and understand them;

(b) Foster an understanding of benefits from implementing Recommendation No. 49 and its Guidelines through education and training;

(c) Develop and maintain these supporting instruments, such as translations into local languages and implementation guidelines;

(d) Define the requirements[25] and governance structure for electronic signatures and establish mutual recognition to create clear rules for cross-border trust,[26] ensuring that an electronic signature holds the same legal value as a handwritten one;[27]

(e) Improve the quality of national security infrastructure (e.g. in the field of qualified digital signatures) by aligning national and regional legislation and implementing global standardization;

(f) Help establish trust in digitally verifiable documents and attestations and encourage their acceptance for documents such as governmental permits, licences, DPPs, trusted attestations, certificates and lab results, as a replacement for analogue documents[28]; and

[24] See FAO, Requirements for Phytosanitary Certificates. Available at https://www.fao.org/4/y3241e/y3241e06.htm; and Government of the United Kingdom, Get Proof of Origin for Your Goods (6 November 2024). Available at https://www.gov.uk/guidance/get-proof-of-origin-for-your-goods.

[25] European Commission, eIDAS Regulation (4 April 2024). Available at https://digital-strategy.ec.europa.eu/en/policies/eidas-regulation.

[26] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Trust Services for Cross-Border Paperless Trad (3 October 2024). Available at https://www.unescap.org/events/2024/trust-services-cross-border-paperless-trade.

[27] United Nations Commission on International Trade Law (UNCITRAL), Model Law on the Use and Cross-Border Recognition of Identity Management and Trust Services (2023). Available at https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/mlit_en.pdf).

[28] UNCITRAL, Model Law on Electronic Transferable Records (2018). Available at https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/mletr_ebook_e.pdf.

(g) Legally and technically enable customs authorities to leverage DPPs to increase import and export border compliance, improve risk analysis, and facilitate trade;

(h) Incentivize industry sectors to share and potentially register their certification schemes, and related segment, jurisdiction, or sector-specific vocabulary with UN/CEFACT;

(i) Incentivize the collection and management of primary data with similar cost and complexity as it is with secondary data when making sustainability claims and disclosures;

(j) Engage with various stakeholder groups, such as government employees, workers and their representative bodies, economic operators, consumers, second-market actors, and solution providers to understand their requirements with regard to Recommendation No. 49;

(k) Support the participation of SMEs as well as developing countries. To keep costs low, fund contributions to the development and maintenance of supporting instruments, and the implementation of open-source technologies. Also incentivise professional service providers to help data owners, claim and certification issuers, and certification holders to participate in the ecosystem; and

(l) Consider joining the UNECE Call to Action — The Sustainability Pledge[29] for traceability and transparency of sustainable value chains, and its Community of Practice, and encourage value chain actors in their economy to do the same.

37. Part II provides the Guidelines for Recommendation No. 49 with information about implementation challenges and implementation principles for supporting instruments to the recommendation. This information should be useful for all concerned parties, including policy makers, regulators, and value-chain actors.

[29] ECE, The Sustainability Pledge. Available at https://thesustainabilitypledge.org/.

Part II

Guidelines for Implementing Recommendation No. 49: Transparency at Scale – Fostering Sustainable Value Chains

38. This section outlines the challenges to global value chain transparency. It defines a set of design principles for instruments intended to support Recommendation No. 49, to address such challenges. The design principles pertain to the architecture, interoperability, trust and conformity, business incentives, adoption, and governance of supporting instruments.

I. Supporting instrument implementation challenges

Complex dependencies and scalability	Global value chains connect millions of actors across industries and borders, exchanging billions of shipments. Some communities share data via centralized or federated platforms. Scalable solutions should seek to connect these systems together with decentralized data sources using a cost-minimizing approach.
Interoperability across industry and cross-borders	Emerging regulations mandate transparency, including DPPs, for goods like batteries, construction materials, textiles, and plastics. As value chains cross industries and borders, interoperability challenges arise.
Misleading behaviour	Due diligence laws help reduce harm, misleading sustainability claims, risks of penalties and reputational damage. But as sustainable products gain value, misleading claims rise. Buyers need instruments to verify supplier disclosures.
Low business incentives for implementation	Suppliers, especially upstream, lack incentives for sustainability due to poor visibility of trusted data. Proving sustainability for trade and finance opportunities is also challenging. Buyers using industry averages for their disclosures hinder suppliers' ability to compete on sustainability and limit their improvement.
Unequal digital maturity and adoption	Value chains include actors, like SMEs, with varying degrees of digital maturity and developing countries with limited infrastructure. Mixed data formats (digital and PDFs) persist. Requiring uniform digitalization across all actors is unrealistic.
Confidentiality, sovereignty, and privacy	Transparency counters misleading sustainability claims but risks exposing sensitive data, discouraging participation. Data sensitivity varies by industry and actor.
Implementation costs	For a positive business case, digital traceability and transparency costs, including auditing costs, must be lower than the value derived from the data. With slim price margins for sustainable products, implementation costs must be minimal.
Conformity costs	Increasing demand for trustworthy sustainability claims could lead to excessive audit fees that may reduce available funds for actual sustainable transition work.
Lack of implementation capacity	Many policymakers, government agencies, and businesses, especially in developing countries, lack familiarity with transparency systems and technologies, leading to hesitation in adopting them.

Lack of regulatory alignment	Differing national regulations on data hosting, sovereignty, and privacy can hinder cross-border data flows, impeding transparency at scale, which relies on international data exchange.

II. Supporting instrument design principles

A. Architecture design principles

39. Global value chains are complex and ever-changing. Scalable solutions provide bottom-up visibility, where traceable, transparent chains emerge as each actor, or community of actors, has instruments and incentives to operate independently.

Use a standards-based architecture protocol over platform	A standards-based decentralized architecture can act as a bridge between centralized, federated and decentralized systems. Each actor can use the systems or platforms of their choice, so long as they conform to the same standard (aka protocol) for linking systems. This enables traceability and transparency to emerge organically from complex, dynamic value chains without dependencies.
Maintain sustainability information at the product level	Buyers in value chains need quality and sustainability information at the product level, particularly quantitative metrics (e.g carbon footprint) so that they have reliable primary data to inform their own sustainability assessments. The data must uniquely identify products at the model, batch or item level and should include product details (e.g. description, materials, packaging). Quality and sustainability claims (e.g. emissions, circularity) should also be included and should reference the relevant criteria from reference standards or regulations. A DPP (first referenced in the EU Ecodesign Product Regulation) is a relevant example. Governments can support industries by incentivizing collection and management of primary data, ensuring that costs and complexity are comparable to those of secondary data.
Maintain sustainability information at the facility level	Sustainability performance is often managed at the facility level rather than the product level. For example, deforestation status is linked to the geolocation and boundaries of a farm and labour rights are managed at the factory level. Facility-level information records should be maintained separately and referenced by any product data sets made at the facility. The records should include a unique facility identifier, geolocation data, processes data, and facility level sustainability metrics (e.g. annual emissions).
Use product or facility identifiers as signposts to rich data	Identifiers globally and uniquely identify products, facilities, assets and organizations. When identifiers are discoverable, resolvable, and verifiable then they can serve as a signpost to verified data, enabling users to access, for instance, a DPP from a product ID. • Discoverable: data is easily found via online searches or scanning data carriers • Resolvable: IDs provide a standard method to locate verifiable data from a single source • Verifiable: the ownership of the identifier can be verified

	By pulling data from its source using identifiers, data sharing becomes more robust. For example, a product data set is still discoverable from the barcode on the box even if the product has passed through multiple intermediaries.
Traceability information links inputs to outputs and buyers to suppliers	Manufacturing processes consume input products or materials and transform and/or assemble them into output products or materials. Manufacturing processes may operate at the individual item level (e.g. a vehicle assembly) or at the batch level (e.g. mineral refineries). When the inputs in a manufacturing bill of materials are uniquely identified and themselves have related product sustainability data sets, then transparency of the product's lifecycle through to source materials emerges. Just as manufacturing processes link input and output products, logistics processes such as the shipment of goods from one facility to the next creates a facility-level value chain map. In short, traceability pictures emerge because natural business processes reference identified products and facilities.
Account for stocks and flows with mass balance	Many manufacturing processes use mixed materials as inputs (e.g. ore concentrate from two mines in a refining process). When each input has different sustainability performance metrics, such as emissions intensity, then the output must accurately reflect the input mix. Fraud can occur, for example, when a fabric manufacturer buys one ton of organic carbon neural cotton and nine tons of cheaper cotton and resells all the output cloth as premium re-presenting the same evidence to each buyer. Instruments should develop mechanisms to track the mass-balance of inputs and outputs stocks and flows at the facility level.
Manage complexity through modular and extensible components	Implementation of a scalable decentralized transparency scheme across complex value chains requires different stakeholders in different industries to play their part. Supporting instrument specifications should be modular and extensible to manage complexity. • Modularity: (i) Separate components such as data schemes, such that they can be implemented with minimal dependency on others; (ii) Use a standards-based, decentralized approach to enable bridging between existing federated and centralized data sharing networks. • Extensibility: Maintain common core data schemes that can be extended to create schemes that meet specific industry sector needs.

B. Interoperability design principles

40. Industry uses identifier schemes for products, facilities, assets, and organizations. Many sustainability schemes exist. Some communities share data via centralized or federated platforms. A scalable solution should build bridges between these systems.

Integrate with existing centralized or federated ecosystems	Organizations that have already chosen to join either a centralized traceability platform (e.g. a single commercial system) or a federated ecosystem (e.g. Catena-X) should be able to continue with their existing choice. Supporting instruments should define integration models.

	• Commercial platforms should be able to participate in the same way as individual systems, by implementing the interoperability standards defined by the supporting instrument. Federated ecosystems should be able to interoperate with decentralized ecosystems by developing bridges that allow data to flow between ecosystems.
Reuse existing standards where possible and appropriate	Global standardization aligns frameworks across jurisdictions and industries, minimizing fragmentation and ensuring compatibility with existing standards for seamless adoption. Instruments should use open standards to avoid lock-in and enable participation, especially for SMEs and developing regions.
Layered and testable specifications	• Layered: Interoperability is optimized when there is clear separation between components such as technical protocols, security, identity, data format, semantic vocabularies, and governance. • Testable: Software systems adhering to the same standards must be testable to confirm compatibility across different actors' software systems.
Leverage existing identifier schemes and data carriers	Identifiers and data carriers are already ubiquitous across value chains. There are many hundreds of schemes, and most are very entrenched and hard to change (e.g. in certain countries hundreds of millions of livestock are identified each year with a livestock ID in an RFID tag). Unless required by legislation, supporting instruments should build on existing identifier schemes and data carriers rather than introduce new ones.
Support self-issued identifiers	Supporting instruments should (i) accommodate existing identifier schemes and (ii) define mechanisms that allow market operators to opt for self-issued decentralized identifiers for their products, rather than centralized identifier systems, unless such registers are mandated by local regulations.
Build on existing regulations and conformity schemes	Hundreds of different industry sustainability standards and national sustainability regulations already exist. Each define multiple specific assessment or compliance criteria. Unless required by legislation, supporting instruments should build on existing sustainability standards and regulations rather than introduce new ones.
Empower industry to leverage existing vocabularies	Industry sectors have often already agreed on common vocabularies (eg. building codes, chemical substances, plant species, etc.) at national and/or international levels. Supporting instruments should accommodate existing industry vocabularies rather than define new ones.

C. Trust and conformity design principles

41. As sustainable products gain value, so does the motive to falsify claims. For sustainability to remain incentivized, claims must be accurate and trustworthy.

Use independent attestations to add trust and confidence	Conformity assessment bodies (CABs), which may be accredited following the International Organization for Standardization (ISO) CASCO framework, issue attestations of conformity with

	reference standards and regulations. An attestation typically includes many individual assessments of products or facilities against specific conformity criteria (e.g. missions, welfare). Independent conformity attestations add trust to the claims made by market operators about their products or facilities. Supporting instruments should define digital standards for these conformity attestations so that they are harder to fake and so that buyers can automate the verification of sustainability claims.
Use primary evidence, if possible and cost effective	Formal conformity assessment and certification can be very costly. High integrity primary evidence such as satellite survey data may achieve greater confidence (e.g. that a farm has not been deforested) at a lower cost.
Reference unambiguous criteria in both self-assessed claims and independent attestations	Both assessments in digital conformity attestations and claims in digital product and facility data sets should unambiguously reference conformity criteria (from standards or regulations) they are based on, requiring each criterion to have a globally unique identifier. Supporting instruments should provide mechanisms for scheme owners to publish detailed assessment or compliance criteria in both human- and machine-readable formats.
Trust anchors — make existing trust verifiable	A trust anchor - such as a national land, trademark, or business registry, or a national accreditation body certifying conformity assessors - ensures digital integrity by linking sustainability claims and identities to authoritative sources. Supporting instruments must define protocols for trust anchors to maintain their roles digitally, typically by issuing registration certificates as digitally verifiable documents tied to the registered entity's digital identity.
Trust graphs — because value chains are graphs	A finished product's footprint (e.g. carbon, environmental) stems from all transformations across its value chain lifecycle. While individual credentials may be valid, their contextual accuracy must be confirmed. For instance, a body accredited to test steel strength may not be authorized for emissions certificates; a valid emissions certificate tied to an unrelated accreditation would be fraudulent. Supporting instruments should define methods to verify the contextual scope of linked credentials, enabling data verification across a bundle of related data sets.

D. Security and confidentiality design principles

42. Supporting instruments shall provide implementation concepts to allow for business confidentiality in the decentralized architecture. There is a trade-off between the demands of transparency and confidentiality; transparency improves value chain visibility, reducing misleading claims, but excessive data sharing can compromise proprietary business information. A key principle is that value chain actors must be able to retain control over their data, while complying with relevant policies and regulations governing mandatory disclosure requirements in claims.

High integrity data is tamper-evident, revokable, and identity linked	Data integrity ensures protection against tampering by malicious intermediaries and confirms data validity (e.g. that has not been revoked by the issuer). Identity integrity verifies that parties named in the data, such as manufacturers or conformity assessment bodies, are genuine. Supporting instruments must adopt solutions based on open standards and secure cryptographic protocols, ensuring data and identity integrity

	remain verifiable in decentralized systems, regardless of the data exchange methods used.
Provide tools for confidentiality and privacy of decentralized data	Privacy and confidentiality in a decentralized ecosystem, that links together decentralized, federated and centralized systems, works differently than more traditional system authentication and authorization models. Supporting instruments should define mechanisms for value chain actors to: • Redact received data without impacting its integrity. For example, to redact confidential evidence from an audit report, leaving just the conformity scores. • Encrypt data to prevent access by anyone without a key. For example, to ensure that only the legitimate buyer of goods can see the bill of materials. • Grant access to sensitive data only to requestors who can prove their authorized role. For example, only an accredited recycling plant can access disassembly data.
Data sovereignty — rights remain with owners	Supporting instruments should define mechanisms to ensure that data is stored in the issuer's jurisdiction, and that rights and monetization opportunities remain with the owner.
Data resilience / backup storage	Decentralized data stores may not remain available after market operators go out of business or cease service in a region. But data about their products may need to be available to users for much longer. Supporting instruments should define mechanisms for durable storage and resilient access to data, especially when such requirements are mandated by regulations.

E. Business incentives design principles

43. Voluntary standards need a business case to be adopted. When stakeholders see quantifiable gains at low cost - like market access, higher prices, or better financing - then implementations grow naturally.

Adopt a cost-oriented interoperability approach	To minimize costs and boost innovation: • Use open standards, including normative standards developed for regulatory purposes, to drive competition and lower costs. • Offer free, open-source implementations based on these standards. • Adopt decentralized architectures that can link federated and centralized systems, and avoid imposed software. • Enable existing investments in identifiers and data carriers to minimize re-tooling costs. Define mechanisms for market operators to opt for self-issued decentralized identifiers for their products.
Promote value through compliance and market access	To increase the value of sustainable products: • Boost consumer demand for trusted sustainable products, driving premium pricing or higher sales. • Enforce regulations, when non-compliance may result in restricted market access or higher taxes.

	• Promote primary data use, when appropriate and cost effective, for corporate climate financial disclosures. • Encourage buyers to select suppliers based on upstream product performance.
Promote sustainable finance	Increase access to sustainable finance: • Improved trade (cashflow) finance terms for sustainable trade. • Improved loan (capital) finance terms for sustainable investments.

F. Adoption design principles

44. Complex value chains involve actors with varying technology maturity, so digital traceability and transparency adoption will be gradual. Data should be human- and machine-readable. Software platforms can simplify complexity, enabling businesses, especially SMEs, to participate equally.

Adoption is sporadic and gradual — humans and machines coexist	Provide user-friendly tools and services that handle mixed data (structured and unstructured) without needing technical expertise. Digital data, like product passports, must be both human-readable and machine-readable to suit varied consumer capabilities.
Incentivize software platforms with tests and registrations	Supporting instruments should offer or reference tools for interoperability testing across all technical components, including vocabularies, protocols, and security mechanisms (e.g. digital signature verification).
Focus on capacity building because there is a lot to learn	Share credible reports on industry cases and national pilots to enhance understanding and build trust in transparency technologies among government and industry. Conduct pilots to build national capacity.
	Educate policymakers on tailoring transparency systems to jurisdictional needs and promote international cooperation for compatible data exchange rules. Encourage reuse of UNCITRAL model laws on e-commerce, identity, and transferable records.
Set goals and measure KPIs to track impact	Establish reporting frameworks to track key performance indicators that can be used to measure the impact of the supporting instruments.

G. Governance design principles

45. Transparent value chains need a common core standard for cross-industry and cross-border interoperability. Sector-specific communities, led by industry associations, should create extensions to meet their needs, keeping the core standard simple.

Activate community centric adoption patterns	To scale implementation across large number of organizations, supporting instruments should define mechanisms to activate community level implementations. A good approach is to partner with industry member associations and to empower them with the tools and business incentives to activate their membership. Governments can also leverage incentives to encourage participation.

Open, inclusive and permissionless governance	Open governance ensures transparency and trust, incorporating diverse perspectives from policymakers, businesses, and civil society. Governance bodies must do the following: • Define clear goals, membership, and contribution rules. • Represent diverse, multilingual stakeholders with varied technical and sectoral interests. • Use transparent, consensus-based decision-making, with simple-majority voting if consensus cannot be reached. • Share reviewable governance and election processes, avoiding undue influence. • Set a code of conduct for experts, including dispute resolution. Instruments should be permissionless, allowing all to participate in development and adoption. This promotes equity, innovation, and accessibility with low-cost, user-friendly designs and onboarding resources.

III. Supporting Instruments

46. This Recommendation No. 49 defines a set of principles for action and for supporting instruments to achieve transparency at scale for sustainable value chains. UN/CEFACT is developing and will be maintaining a supporting instrument for transparency at scale, called the UNTP, that implements the design principles described in this recommendation. UNTP is outlined in Annex I.

Annex I

The United Nations Transparency Protocol

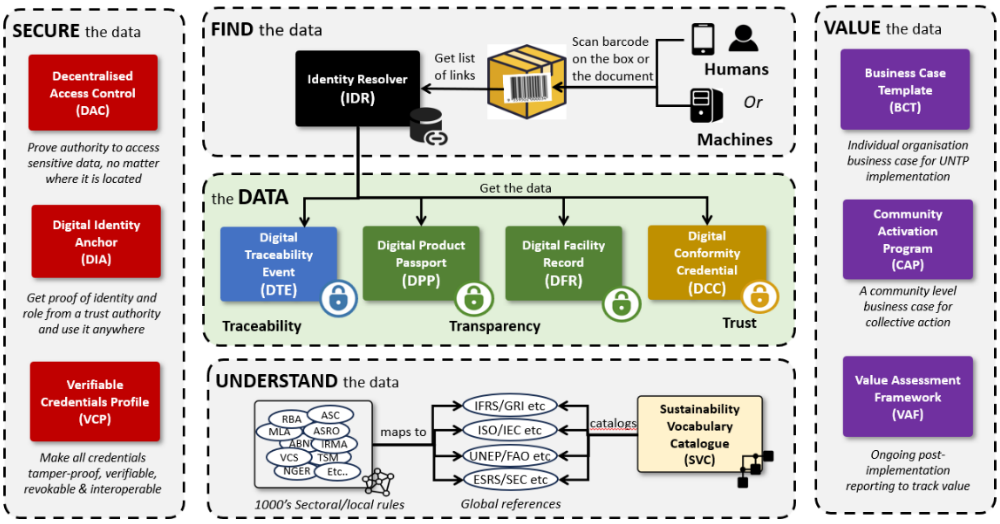
1. This annex introduces the United Nations Transparency Protocol (UNTP), a supporting instrument for Recommendation No. 49 being developed by UN/CEFACT according to the design principles set forth in Part II and supporting the policy recommendations introduced in Part I, Chapter E.

2. UNTP maximizes reuse of existing investments by building upon existing open standards such as the UN/CEFACT Buy-Ship-Pay Reference Data Model (BSP-RDM) and standards from the ISO and the World Web Consortium (W3C).

I. UNTP overview

3. The UNTP assumes that value chain transparency data is spread across numerous independent systems and that a practical, scalable traceability framework must keep this data distributed yet make it discoverable and linkable. Built on a fully decentralized data architecture, UNTP avoids reliance on any single technology or platform, instead establishing interoperability standards to enable thousands of independent systems to contribute to a global transparency ecosystem.

Figure 1
UNTP overview



Source: ECE, 2025

4. As shown in Figure 1, UNTP comprises five key pillars:

(a) The data: A suite of data specifications for product data (for use in DPPs), facility data (DFR), traceability data (DTE), and conformity attestations (DCC);

(b) Finding the data: An identity resolver (IDR) specification which defines how to make the data discoverable and consumable by humans or machines;

(c) Understanding the data: A catalogue of sustainability schemes (SVC) with links to machine-readable criteria maintained by scheme owners, allowing claims and assessments to unambiguously reference scheme criteria;

(d) Securing the data: A suite of specifications that define how to add integrity, identity, and confidentiality to any data that is shared; and

(e) Valuing the data: A library of guidance material to assist implementers with making a business case for implementation of the voluntary UNTP standard.

II. UNTP governance

5. The UNTP development follows the open development process[1] and governance rules[2] for UN/CEFACT projects and deliverables, meaning it is:

(a) An open standard, free to use.

(b) Developed and maintained via an open and collaborative, inclusive and consensus-based process.

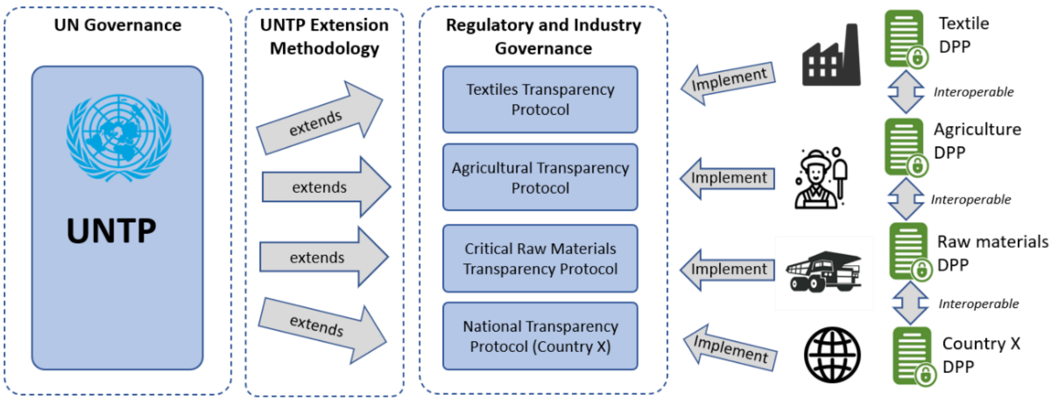
(c) Version controlled and life cycle managed.

6. The latest stable version of UNTP specifications will always be available by default on the UNTP website.

III. Regulatory or industry specific extensions

7. As illustrated in Figure 2, UNTP serves as a universal core applicable to any regulatory jurisdiction or industry sector. Its extensions methodology enables tailored adaptations for specific industry sectors or markets while preserving interoperability with other extensions. This cross-industry and cross-border compatibility is central to UNTP, as most value chains span multiple sectors and countries. Extensions are maintained outside of UNTP by their extension owners but are registered with UNTP as a conformant extension.

Figure 2
Regulatory or industry specific extensions of UNTP



Source: ECE, 2025

A. Value chain example

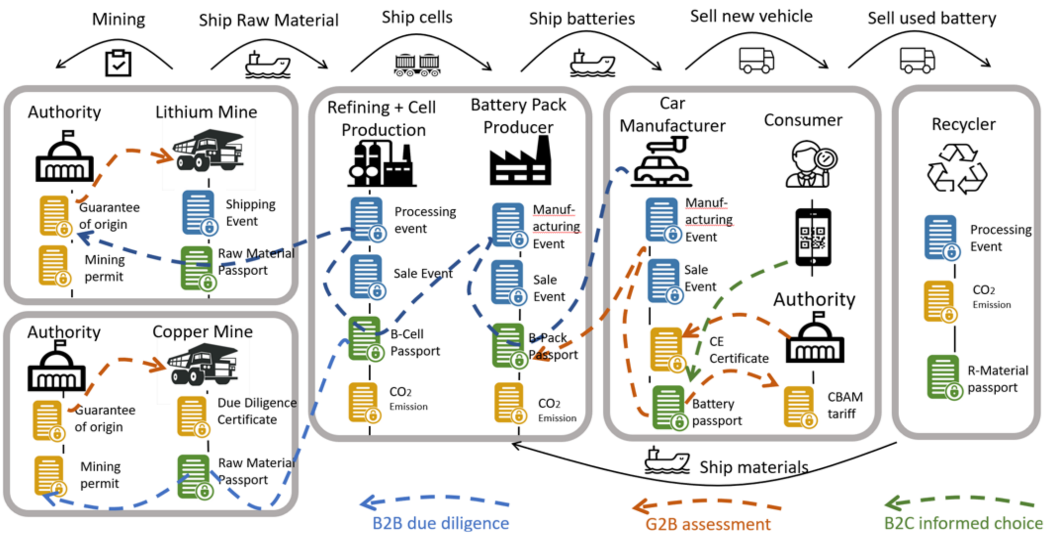
8. When product passports and facility records are linked through traceability events and optionally linked to trusted attestations, such as conformity credentials, then a complete value chain picture emerges. In the example shown in Figure 3 high integrity sustainability information is discoverable from the electric vehicle (car) battery manufacturer back to the

[1] UN/CEFACT, Open Development Process, (Available at https://unece.org/trade/documents/2023/12/session-documents/open-development-process).

[2] UN/CEFACT, Governance, (Available at https://github.com/uncefact/governance?tab=readme-ov-file#governance).

mining and refining operations that provided the critical minerals[3] as well as forward to consumer use and eventual recycling[4].

Figure 3
Transparency of a battery supply chain for authorities and consumers



Source: ECE, 2025

IV. Implementation testing

9. Interoperability is central to UNTP, enabling DPPs from one implementer to be read and verified by another. Implementers must conduct rigorous interoperability testing to ensure their software complies with the UNTP standard. The UNTP website provides a test suite and tools for self-assessing conformance, with each UNTP version paired with a specific test suite. Implementers should test major software versions against the targeted UNTP versions. For industry or jurisdictional UNTP extensions, conformance testing must also be provided, addressing sector-specific vocabularies and processes. UNTP offers best-practice guidance and examples to adapt core tests for these extensions.

V. Success measures

10. The primary aim of UNTP is to enhance product sustainability and curb misleading sustainability claims, but its success hinges on adoption by implementers and the volume of verifiable sustainability data shared. UNTP will gauge uptake by tracking pledges (commitments to adopt) and completed conformity tests (confirmed implementations), with results displayed on its website. To meet its objectives, UNTP must achieve tens of thousands of implementations across diverse value and supply chain stakeholders, including producers, manufacturers, regulators, certifiers, and software developers.

VI. Mapping to design principles

11. As a supporting instrument for Recommendation No. 49, the UNTP implements most of the design principles as shown below.

[3] OECD, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, (2016) (Available at https://doi.org/10.1787/9789264252479-en).
[4] OECD, OECD Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector (2017) (Available at https://doi.org/10.1787/9789264252462-en).

Design principle	*UNTP component*
Architecture principles	
Use a decentralized architecture – protocol over platform	Architecture
Maintain sustainability information at product level	Digital Product Passport (DPP)
Maintain sustainability information at facility level	Digital Facility Records (DFR)
Use product or facility identifiers as signposts to rich data	Identity Resolver (IDR)
Traceability information links inputs to-outputs and buyers to suppliers	Digital Traceability Event (DTE)
Account for stocks and flows with mass balance	Chain of Custody (CoC)
Manage complexity through modular and extensible components	Architecture
Interoperability principles	
Re-use existing standards when possible and appropriate	References
Layered and testable specifications	Testing
Leverage existing identifier schemes and data carriers	IDR
Support self-issued identifiers	IDR
Build on existing regulations and conformity schemes	Sustainability Vocabulary Catalogue (SVC)
Empower industry to leverage existing vocabularies	Extensions
Integrate with existing centralised or federated ecosystems	
Trust and conformity principles	
Use independent attestations to add trust and confidence	Digital Conformity Credentials (DCC)
Reference unambiguous criteria in claims and attestations	SVC
Trust anchors – make existing trust verifiable	Digital Identity Anchor (DIA)
Trust graphs – Verify linked data graphs	Graphs
Security and confidentiality principles	
High integrity data is tamper proof, revokable and identity linked	Verifiable Credentials Profile (VCP)
Provide tools for confidentiality and privacy of decentralised data	Decentralised Access Control (DAC)
Data sovereignty – rights remain with owners	Architecture
Data resilience / backup storage	Not in scope
Business incentives principles	
Promote value through compliance and market access	Business Case
Promote sustainable finance	Business Case
Minimising cost through commoditisation	Business Case
Adoption principles	
Adoption is sporadic and gradual – humans and machines coexist	
Incentivise software platforms with tests and registrations	Register
Focus on capacity building because there’s a lot to learn	Guidance
Set goals and measure KPIs to track impact	Value Assessment Framework (VAF)
Governance principles	
Activate community centric adoption patterns	Community Activation Program (CAP)
Open, inclusive and permissionless governance	Governance

Annex II

Glossary of terms

Acronym or term	*Definition*
AEO	The Authorized Economic Operator is a party involved in the international movement of goods that has been approved by or on behalf of a national customs administration as complying with the World Customs Organisation (WCO), or equivalent supply chain security standards
Circularity	Circularity of a production process refers to the ability of this process to retain the value of products, materials and resources in the economy for as long as possible and to minimize, to the extent possible, the generation of waste along all the steps of the value chain
CoC	The Chain of Custody is the process of following materials through every step of the supply chain as they go through various stages of sourcing, production, processing, shipping, and retail
Community audit	Community audit is a participatory process empowering communities to assess and enhance local sustainability
Conformity assessment bodies	A conformity assessment body may be an (independent) party that performs conformity assessment activities that provide various types of assurance that products, processes, systems, persons or bodies fulfil requirements set out in specifications such as international, regional, or national standards
DCC	Digital conformity credentials are issued by trusted third parties and provide an assessment of product or company ESG performance against credible standards or regulations
DPP	A Digital Product Passports (DPP) contain digital, cryptographically verifiable sustainability information about a product, making it easy to access and to understand by all interested parties. As DPPs are being defined in many jurisdictions, in this recommendation, we use the term as a general concept (sometimes referred to as the UN DPP). The UN DPP includes commodities, materials, consumer products, and services and hence has a broader focus than the EU DPP, that is the first globally regulated framework for DPPs
EC	European Commission
ECE	United Nations Economic Commission for Europe
ESG	Environmental, social and governance
ESPR	The Ecodesign for Sustainable Products Regulation which entered into force on 18 July 2024, is the cornerstone of the European Commission's approach to more environmentally sustainable and circular products[1]
EU DPP	The EU DPP is the digital product passport is defined in EU regulations, specifically in the new Battery Regulation and in the ESPR. It is focused on consumer goods and batteries According to European law the EU DPP must be implemented using harmonized standards. Economic operators can use these to demonstrate that their DPPs comply with the EU legislation. Recommendation No. 49 seeks alignment and interoperability with the EU DPP once its harmonized standards are published According to the ESPR, the EU DPP is a tool for making information available to actors along the entire value chain. The availability of a digital product passport is expected to significantly enhance end-to-end traceability of a product throughout its value chain. Among other

[1] EU, Ecodesign for Sustainable Products Regulation. Available at: Regulation - EU - 2024/1781 - EN - EUR-Lex.

Acronym or term	*Definition*
	things, DPP is expected to i) help customers make informed choices by improving their access to relevant information; ii) allow economic operators, namely manufacturers, authorised representatives, importers, distributors, dealers and fulfilment service providers, and other value chain actors, such as customers, professional repairers, independent operators, refurbishes, remanufacturers, recyclers, market surveillance and customs authorities, civil society organisations, researchers, trade unions, and the Commission, or any organisation acting on their behalf, to access, introduce or update relevant data; and iii) enable competent national authorities to perform their duties, without endangering the protection of confidential business information. The EU DPP has the capability to track and trace the product from the point it is introduced into the market (the gates of the economic operator), until the product is dropped-off as waste and its lifetime cannot be prolonged by re-use, repair, or refurbishment
Footprint	The footprint (e.g. carbon, environmental) of a finished product is derived from the footprints of all the transformations the product underwent during its life cycle in the value chain
Greenwashing	Misleading the public to believe that a company or other entity is doing more to protect the environment than it is
ISO	International Organization for Standardization
Interoperability	Unless otherwise indicated by the context, for Recommendation No. 49 interoperability is relevant in the areas of data and file formats, vocabularies, exchange protocols, security, identity, storage and governance
LCT	Life Cycle Thinking (LCT) is about going beyond the traditional focus on production site and manufacturing processes to include environmental, social and economic impacts of a product over its entire life cycle. The main goals of LCT are to reduce a product's resource use and emissions as well as improve its socio-economic performance throughout its life-cycle
NFC	Near Field Communication (NFC) is a wireless communication standard that allows smaller amounts of data to be exchanged between NFC devices. That this data exchange can only take place over a short distance of 1-10 cm
Primary data	Primary data is sustainability data that comes from primary sources, i.e. verifiable data points that have been collected from the respective value chain members and not estimated using average data
QR code	Commonly known as Quick Response code
Regional policy	Regional policy is defined as a policy derived and enforced via a supranational governance authority, such as the European Union, which has jurisdiction to enter into agreements on the matters at hand
Risk-Based Due Diligence	Risk-based Due Diligence is understood as "the process through which enterprises can identify, prevent, mitigate and account for how they address their actual and potential adverse impacts as an integral part of business decision-making and risk management systems"[2]
SDG(s)	United Nations Sustainable Development Goals
Secondary data	Secondary data is sustainability data that was estimated and comes from secondary sources, such as CO2 emissions average data bases
Social washing	Social washing is a strategy used to mislead the public into believing that a company or other entity is doing more to protect social and human rights, than it actually is, for financial gain

[2] OECD, Due Diligence Guidance for Responsible Business Conduct (2018). Available at: https://mneguidelines.oecd.org/OECD-Due-Diligence-Guidance-for-Responsible-Business-Conduct.pdf.

Acronym or term	*Definition*
Sustainability	Sustainability in the context of value chains means that all activities, throughout a product's life cycle, take into account their environmental, health, human rights and socioeconomic impacts, as well as their continuous improvement
Sustainability claim	A sustainability claim is a statement or evidence (such as a certificate) that was provided by an actor about a company, product or process ESG practices, performance and impacts
Sustainability disclosure	A sustainability disclosure is a statement that was made by an actor about an organization's ESG practices, performance, and impacts
Sustainability information	Sustainability information is an umbrella term that includes, for example, sustainability disclosures (companies), sustainability claims (products), and traceability information that provide evidence about the ESG practices, performance and impacts of a company, product, or process. It helps consumers, businesses and other stakeholders make informed choices
Sustainability requirements	Sustainability requirements refer to specific criteria or conditions that must be met to ensure the sustainable quality of a product and its sustainable production. These requirements must be fulfilled in order to acquire a sustainability status or certification
Traceability	Traceability is understood as "the ability to trace the history, application or location of an object" in a value chain. In this context, it is defined as the ability to "identify and trace the history, application, transformation, location and distribution of products, parts and materials"[3]
Transparency	Transparency relates directly to relevant information being made available for all elements of the value chain in a harmonized way, which allows for common understanding, accessibility, clarity and comparison[4]
Transparency at scale	Transparency at scale means having sustainability information accessible across different jurisdictions, industries, product segments and steps in the value chain to reach sustainability objectives
Trust graph	A Trust graph allows a verifier of a DPP to also verify all related intermediary product passports, due diligence certificates or transparency events
UNTP	The United Nations Transparency Protocol is a modular and extensible interoperability standard for cross-border and cross-industry exchange of trustworthy supply chain sustainability data
UNTP-CAP	The Community Activation Program serves as a comprehensive framework and collaborative community designed to support industries in developing and implementing their own UNTP extension projects
UNTP-DAC	Decentralised Access Control is a security and confidentiality framework for decentralised access to non-public data
UNTP-DCC	Digital Conformity Credential are second- or third-party attestations of conformity about identified products or facilities issued by conformity assessment bodies against a formal scheme or regulation
UNTP-DFR	Digital Facility Records are lightweight facility (factory, farm, mine-site) information and facility level sustainability claims issued by the facility owner/operator
UNTP-DIA	A Digital Identity Anchor is an identity credential issued to a registered subject by an authority - for example a business registration certificate as a digital and verifiable credential

[3] ECE, 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/2022-01/ECE-TRADE-463E.pdf.

[4] Ibid.

Acronym or term	*Definition*
UNTP-DTE	Digital Traceability Events represent commercial processes of manufacturing (links products to their constituent materials / components) and shipping (links buyer facilities to supplier facilities)
UNTP-IDR	An Identity Resolver is a technical specification for resolving any identifier (both registered IDs and self-issued IDs) to find further information about the identified entity (e.g. given a product ID how to find the DPP)
UNTP-SVC	The Sustainability Vocabulary Catalogue is an index of sustainability schemes, each with a digital representation (scheme, version, assessment criteria) published and maintained by scheme owners
UNTP-VAF	The Value Assessment Framework is a set of metrics and targets supported by a reporting framework that provides a means to monitor the impact of UNTP on sustainable value chains
UNTP-VCP	Verifiable Credentials Profile is a simple technical profile of W3C verifiable credentials for use by all UNTP credential types (DPP, DFR, DTE, DCC)
Value Chain	The full range of activities or processes needed to bring a product or service from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution, and support to the final consumer. The value chain includes entities with which the enterprise has a direct or indirect business relationship and which either (i) supply products or services that contribute to the enterprise's own products or services, or (ii) receive products or services from the enterprise[5]
VCs	Verifiable Credentials (VCs) are a concept in modern web technology. It describes documents that hold structured information and are digitally signed. This makes VCs trustworthy, tamper evident, and cryptographically verifiable. VCs have been defined and standardized, e.g. by ISO[6] and the W3C[7]
W3C	World Wide Web Consortium

---

[5] OECD, Due Diligence Guidance for Responsible Business Conduct (2018). Available at: https://mneguidelines.oecd.org/OECD-Due-Diligence-Guidance-for-Responsible-Business-Conduct.pdf.

[6] ISO/IEC 18013-5:20219, Personal identification — ISO-compliant driving licence, Part 5: Mobile driving licence (mDL) application (September 2021). Available at: https://www.iso.org/standard/69084.html.

[7] W3C, Verifiable Credentials Data Model V1.1 (27 January 2025). Available at https://www.w3.org/TR/vc-data-model-1.1/); See also ECE, "Verifiable Credentials." Available at https://uncefact.github.io/spec-untp/docs/specification/VerifiableCredentials/ (*Note: Final hyperlink is still to be established*).