International Standard

ISO 32120

First edition
2024-09

Transaction assurance in E-commerce — Guidelines on sharing goods quality assurance traceability information in E-commerce supply chains

Assurance des transactions de commerce électronique — Lignes directrices relatives au partage des informations concernant l'assurance qualité et à la traçabilité des marchandises dans les chaînes d'approvisionnement du commerce électronique

Reference number
ISO 32120:2024(en)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 321, *Transaction assurance in E-commerce.*

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

E-commerce has evolved rapidly and flourished globally in recent years. Due to its global and complex supply chains, it brings new challenges to goods quality compliance, anti-counterfeiting, goods recalls and more. As such, buyers, E-commerce platform operators and government agencies, etc., increasingly demand clarity about goods in E-commerce supply chains. The increasing global demand for both proven goods compliance and greater transparency on goods information provenance is best supported by establishing suitable goods traceability and linking appropriate quality assurance information throughout the supply chain.

A shared view of traceability and related goods quality information can provide reliable and sufficient information about the goods quality statements to all relevant participants of E-commerce. Buyers can be enabled to make better informed consumption choices. E-commerce platforms operators, government agencies and other relevant stakeholders can be empowered to better manage goods quality risks.

NOTE For the purposes of the complete coverage of the activities of traceability information sharing, this document includes some participants that are not mentioned within ISO 32111, such as regulatory agencies, quality service providers and customs brokers, etc.

This document focuses on the general process of sharing traceability information related to goods quality assurance in E-commerce. This document makes reference to existing international standards for data models and means of data sharing. To establish effective and resilient traceability in E-commerce supply chains for quality assurance, the specific requirements for data capture and data sharing are developed by consensus with agreed terminology and methodology.

Transaction assurance in E-commerce — Guidelines on sharing goods quality assurance traceability information in E-commerce supply chains

1 Scope

This document provides guidelines for sharing traceability information related to goods quality assurance in E-commerce.

This document illustrates the generic process for establishing traceability for goods quality assurance, addresses critical tracking events (CTEs) and key traceability information in the E-commerce context and provides methods for sharing the collected traceability information.

This document is intended to be applied to E-commerce supply chains only.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 32110, *Transaction assurance in E-commerce — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 32110 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
goods quality statement
statement that declares that the quality of goods conforms with specific requirements

3.2
traceability
ability to either trace or track, or both, the history, application, or location of an object in the supply chain

[SOURCE: ISO 9000:2015, 3.6.13, modified — "either ... or track, or both," and "in the supply chain" added, notes to entry removed.]

3.3
critical tracking event
CTE
critical business traceability event which is the source of traceability data

3.4
identifier
ID
unambiguous, unique and linguistically neutral value resulting from the application of a rule-based identification process

Note 1 to entry: Identifiers shall be unique within one identification scheme. In case of more than one applied identification scheme, linkages between the identifiers should be created. More details are discussed within 7.4.

Note 2 to entry: An identifier is a linguistically independent sequence of characters capable of uniquely and permanently identifying that with which it is associated.

[SOURCE: ISO/IEC 15944-1:2011, 3.27, modified —"ID" added, Note 1 to entry modified to include information about linkages and replace "must" with "shall".]

3.5
business information entity
piece of business data or a group of pieces of business data with a unique business semantic definition

Note 1 to entry: A business information entity can contain one or more entities.

[SOURCE: ISO 15000-5:2014, 3.12, modified — The original notes to entry deleted, a new note to entry added.]

4 General principles

4.1 Principles for traceability

4.1.1 General

Adherence to the basic principles of traceability in 4.1.2 to 4.1.6 can assist participants to obtain precise and sufficient information about goods quality statement(s).

4.1.2 Compliance

Collection, retention, use and sharing of traceability data should fulfil considerations of all applicable requirements.

4.1.3 Transparency

The traceability data should be enabled, open, comprehensive and in an understandable format for all participants.

4.1.4 Pre-defined traceability

The criteria, methods and procedures for the implementation of traceability should be agreed upon and communicated amongst traceability participants to ensure the accurate and timely collection, recording and sharing of necessary information.

4.1.5 Unambiguous identification

All traceable objects should be identified uniquely and permanently to provide certainty and precision for traceability.

The identifiers of these traceable objects should provide necessary references to each other to establish traceability chain.

4.1.6 Competent documentation and recording

All information related to significant traceability events and verification of the quality statement should be recorded according to agreed rules and procedures.

4.1.7 Sustainability aspects

Should sustainability related concerns, such as carbon emissions associated with the logistics process, recycling of the goods or goods materials, be considered, related information should be taken into account.

4.2 Principles for information exchange

4.2.1 General

Adherence to basic principles for information exchange in 4.2.2 to 4.2.5 can assist efficient and effective sharing of traceability information among all participants.

4.2.2 Information integrity

All information should be accurate, complete and consistent.

4.2.3 Information authenticity

All information should be verifiable and consistent with what it claims to be.

4.2.4 Information interoperability

All information should be exchangeable among participants as long as they are predefined, structured and processable by applications.

4.2.5 Information scalability

The related technologies, solutions and systems should be compatible with the future change of data types, formats and granularity, applications in various scenarios, or other factors that can affect the information for exchange.

4.2.6 Information security

Requirements and procedures for accessibility, use and protection of information, as agreed among participants, should be followed in traceability implementation.

4.2.7 Privacy

Personally identifiable information for traceability purposes should be protected to avoid any unauthorized collection, use, retention or disclosure.

5 Context of supply chains in E-commerce

5.1 Overview

E-commerce supply chains mainly consist of the following key processes:

— upstream supply, in which upstream suppliers (e.g. manufacturers, distributors, wholesalers, retailers, sellers) provide goods or goods information to E-commerce operators for sale;

— goods transaction, in which buyers purchase goods from sellers via E-commerce platforms, which can involve goods information release, order placement, order confirmation, payment, etc.;

— logistics, in which logistics service providers provide transportation services for supplied goods and can include non-cross-border transportation, cross-border transportation and delivery, etc.;

— customs clearance, in which imported or exported goods are processed through customs authorities in accordance with required procedures;

NOTE Customs clearance can involve customs declaration, inspection clearance, and dialogue with customs authorities.

— warehousing, in which either the exporting or importing country warehousing service provider, or both, store goods for transportation and can involve picking, packing, distributing, inventory management, etc.;

— after-order-placement, in which E-commerce operators provide services and supports to buyers after the order placement and can involve cancellation of orders, returns, refunds, etc.

Figure 1 provides a generic picture of the E-commerce supply chains. Different paths can be followed going from upstream to downstream in E-commerce transactions.

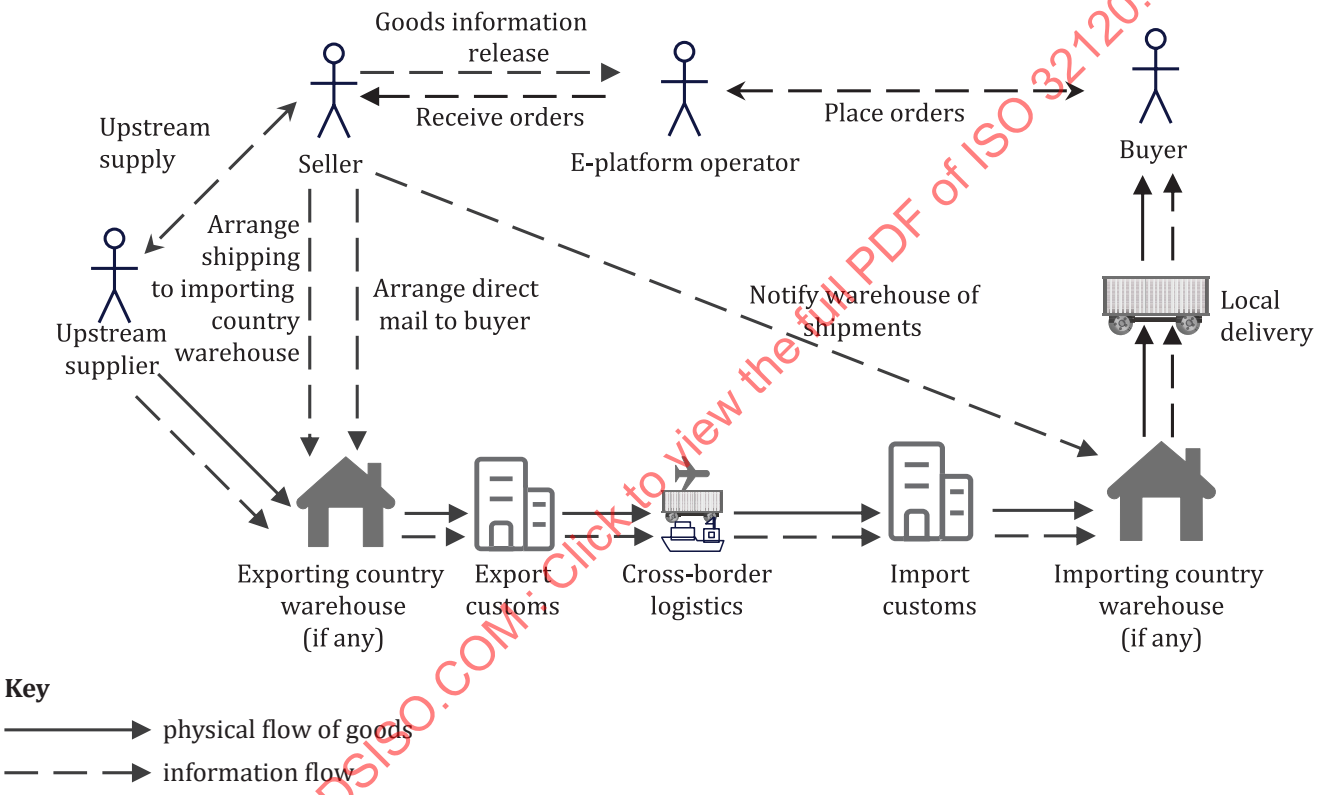


Figure 1 — E-commerce supply chains

Goods information is provided by upstream suppliers to E-commerce sellers, who release the information on the E-commerce platform. Buyers place orders according to the goods information released. When the order information is received by the sellers, sellers arrange the goods shipment. Depending on the availability of goods, sellers can arrange direct delivery to buyers from an exporting country or importing country warehouse, while buyers should be able to track their order information in a timely manner.

Goods are transported by the logistics service provider from upstream suppliers either to the warehouse or delivered to buyers, or both. For cross-border E-commerce, shipments should be cleared at customs before they can be delivered to buyers.

The information flow generated by the online transaction and physical flow of goods provides information on the business events to be tracked and traced. When an after-order-placement service is provided, additional information can be generated as traceability information.

5.2 Driving factors of traceability for quality assurance

5.2.1 Overview

Compliance and transparency are two major driving factors of E-commerce supply chain demands on goods traceability for quality assurance.

5.2.2 Compliance

A large variety of goods traded on E-commerce platforms should meet the goods traceability requirements of countries or regions, such as food, cosmetics and toys. Meanwhile, small-in-size E-commerce, comprised primarily of large volumes of small packaged, low-value, direct-to-buyer goods, poses greater challenges to the regulatory compliance of goods, e.g. inspection resource constraints, data limitation, responsibility identification. All relevant parties in E-commerce supply chains demand availability and accessibility of information for goods compliance. In E-commerce supply chains, the compliance requirements can include:

a) Requirements of local market access: The goods should comply with local requirements regarding quality and traceability, in accordance with those specified by the producing or exporting countries or regions.

b) Requirements of contracts or agreements: The goods should fulfil the quality requirements agreed between goods supplier and buyer as specified in the supplier code of conduct contract or agreement.

c) Platform requirements: The goods should meet the quality requirements set up by the E-commerce platform operators as a prerequisite for online sale.

d) Consistency requirements: The goods should be consistent with all information published on the E-commerce platform and all statements made by the sellers under every circumstance.

5.2.3 Transparency

The virtual environment of E-commerce with the online-presence of some elements (e.g. goods, seller) increases the need for information transparency for all participants of E-commerce supply chains. In the E-commerce context, transparency requirements can include:

a) Data visibility: Participants need a clear view and reliable updates of the conditions of the goods sold online, including but not limited to, where they are or have been, under whose custody they are or have been, when and why certain business process happens, etc.

b) Data availability: Information should be collected, recorded and retained, using open standards, or the format agreed upon within the participants to make it exchangeable for relevant participants.

c) Data accessibility: Authorized participants should be able to accurately obtain and use information to meet their needs of goods quality assurance.

d) Data connectivity: Necessary links should be established among related information in order to enable easy identification and retrieval.

Analysis of compliance and transparency requirements on supply chains in E-commerce can provide guidance to formulate and determine goods quality statements for establishing traceability.

6 Establishing traceability

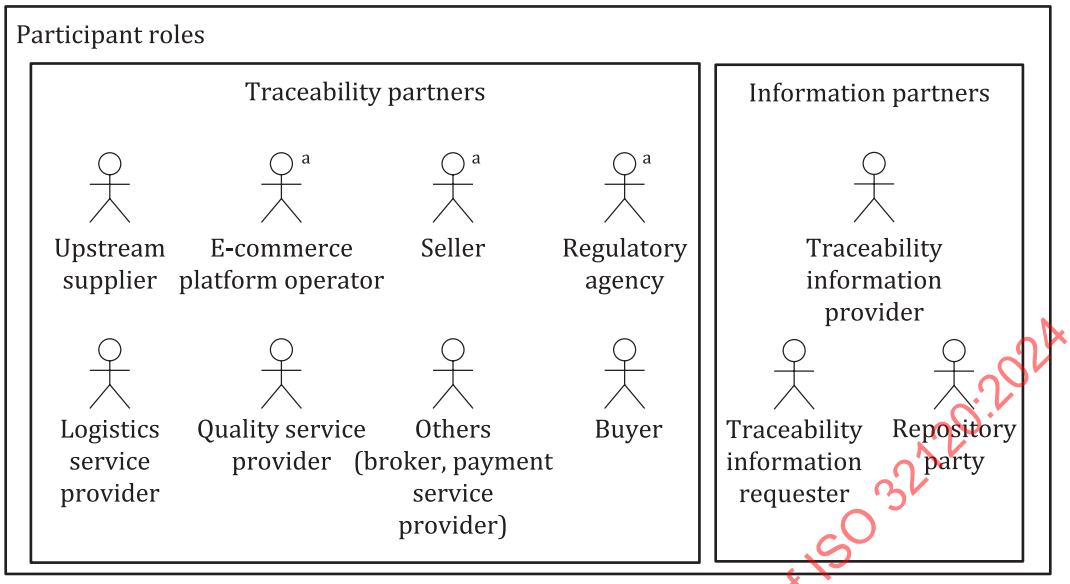
6.1 Participants

Figure 2 gives a generic picture of participants for establishing traceability in E-commerce. They are grouped as:

a) traceability partners, who can directly or indirectly participate in E-commerce traceability;

b) information partners, who can participate in sharing of traceability information.

A traceability partner can be different information partners depending on their roles in traceability.



[a] Traceability initiator in E-commerce.

Figure 2 — Participants for establishing traceability in E-commerce

Table 1 lists information partners with description of their roles in traceability.

Table 1 — Information partners

Participants	Description
Traceability information provider	A party who collects, records, stores and provides traceability information upon request. It can be any traceability partner in E-commerce supply chains.
Traceability information requester	A party who needs traceability information about the traceable objects for its quality statement, e.g. seller, E-commerce platform operator, regulatory agency, buyer.
Repository party	A party who is authorized to manage a traceability system or database, in which the traceability information can be stored and retrieved. This can be any traceability partner in the E-commerce supply chains or an authorized third-party.

Table 2 lists traceability partners with descriptions of their roles in traceability.

Table 2 — Traceability partners

Participants	Description	Roles and responsibilities in information sharing
Traceability initiator	A party that requests that a traceability process be implemented. This can be any traceability partner in the E-commerce supply chain that wants to make a quality statement to its clients or buyers, such as an E-commerce platform operator, seller, regulatory agency, etc.	Organizing traceability activities
Upstream supplier	An organization or individual that provides goods to be sold online, which includes but is not limited to manufacturers, vendors, individual sellers, third-party suppliers, etc.	Traceability information provider, data source for goods information, e.g. goods ID, goods quality characteristics, country of origin.
E-commerce platform operator	An organization who operates an E-commerce platform	Traceability initiator, repository party, traceability information requester or traceability information provider, data source for, e.g. order information.
Seller	An individual or organization who sells goods online	Traceability initiator, repository party, traceability information requester or traceability information provider, data source for, e.g. quality statement information.
Logistics service provider	An organization that provides services of warehousing, transport, distribution of goods traded online, e.g. exporting country warehouse, cross-border logistics, importing country warehouse and local delivery	Traceability information provider, data source for, e.g. waybill information, logistics tracking information.
Quality service provider	A third party who provides goods quality assurance related services, such as certification, testing, pre-shipment inspection, field verification, third-party traceability, etc. A neutral party in ISO 32111	Repository party, or traceability information provider, data source for, e.g. goods certificates, testing or inspection reports.
Regulatory agency	A government or government supported regulatory authority authorized to supervise and manage imported and exported goods based on the relevant laws and administrative regulations, e.g. customs, market surveillance agencies. A neutral party in ISO 32111	Traceability initiator, traceability information requester, or traceability information provider, data source for, e.g. customs clearance information.
Other third-party service providers	A party provides other third-party services for E-commerce supply chains, e.g. customs declaration service, payment service	Traceability information provider, data source for, e.g. payment information.
Buyer	An individual or organization who purchases goods online	Traceability information requester, or traceability information provider, data source for, e.g. receipt information, after-order-placement information.

6.2 Generic process

6.2.1 Overview

There are seven generic processes to establish a traceability system for E-commerce, as illustrated in Figure 3. These processes are applicable across different goods. On this basis, the interested parties are enabled to determine the specific tracking and tracing processes according to specific goods traceability demands.

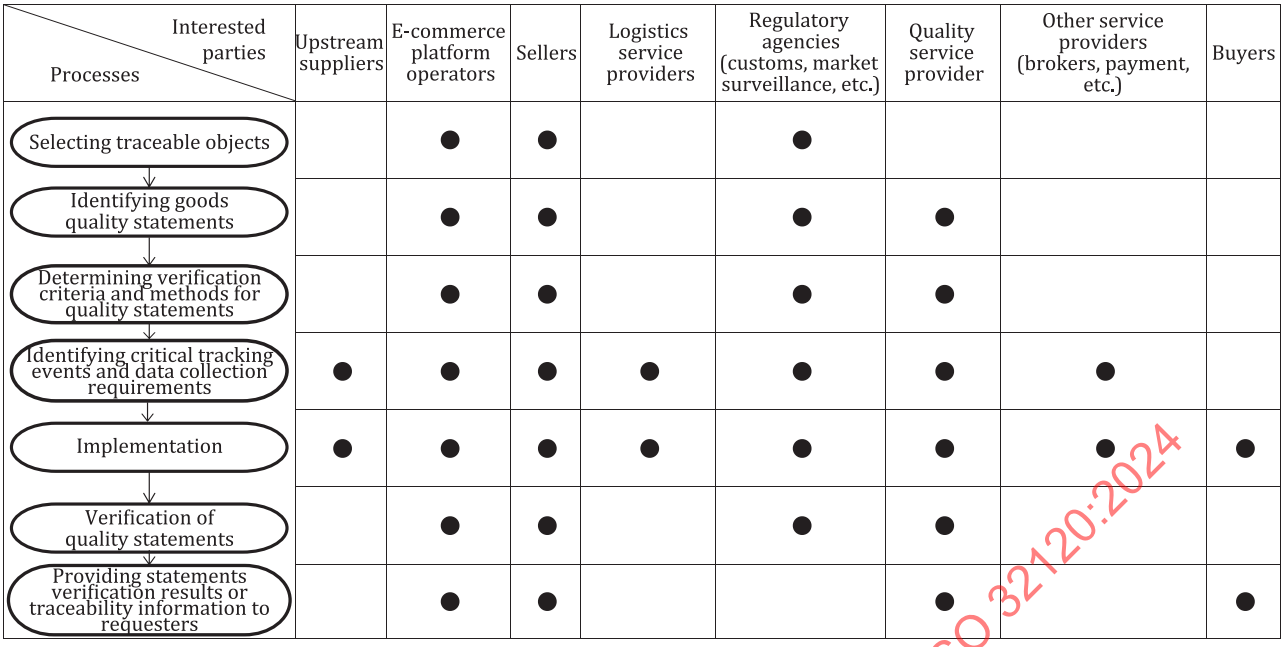


Figure 3 — Illustration diagram for establishing traceability system

6.2.2 Selecting traceable objects

A traceable object in E-commerce is the goods sold online. The objects that can be tracked or traced can be determined by the traceability initiators, such as E-commerce platform operators, sellers and regulatory agencies.

In distribution and logistics, the traceable object in E-commerce can be grouped, packaged and loaded with other objects, which can lead to new traceable objects being tracked and traced (e.g. logistics units, transport vehicles). In such case, the links should be established and recorded between the various aggregation levels.

6.2.3 Identifying goods quality statements for traceability

Goods quality statements are considered to be made when goods quality related information is released and published on an E-commerce platform. A goods quality statement can be a regulatory, policy compliance statement, a consistency statement or the combination of both. A regulatory, policy compliance statement indicates that the goods conform to relevant compliance requirements (see 5.2.2). A consistency statement indicates that the quality characteristics of the goods are consistent with the information displayed. To establish traceability in E-commerce, a quality statement should be identified in order to decide what data is needed and how they are needed to support or verify the statements.

Quality statements for traceability can be determined by the traceability initiator, such as E-commerce platform operators, sellers, regulatory agencies, possibly in consultation with other traceability partners, such as quality service providers.

An example of quality statements is given in Table 3.

Table 3 — Example of quality statements

Goods information published	Quality statements
Pasteurized milk imported from country A to country B	1. This milk is in compliance with market access requirements of country B and relevant technical standards or specifications for pasteurized milk (e.g. production, storage) 2. Country of origin for this milk is country A

6.2.4 Determining verification criteria and methods for quality statement

Verification criteria and methods provide rules for data selection in the traceability process.

Verification criteria set up the standard and key performance indicator that the traceable objects should meet.

Verification methods provide measures to obtain integral and valid data as proof for verification of quality statement. In the E-commerce supply chains, the following measures can be applied:

a) Certification: Certification can be applied to either goods or relevant organizations, or both, to give assurance that goods quality conforms to the specified requirements.

b) Inspection: Inspection can be executed for goods or batches of goods (e.g. pre-shipment inspection, customs inspection), a location (e.g. inspection of production facility, warehouse), or a process (e.g. production process, transport movement). Inspection provides evidence of quality compliance by identifying the actual status of goods via observation and judgement, which can involve visual check, testing, measurement, etc.

c) Testing: Testing can determine one or more goods quality characteristics according to predetermined requirements and procedures.

d) Verification: Verification involves evaluation of goods quality compliance through the provision of object evidence, e.g. documents check, records review.

The verification criteria and methods for quality statement can be determined by the traceability initiator and traceability information provider, possibly in consultation with other traceability partners, such as quality service providers.

Table 4 elaborates examples of verification criteria and methods.

Table 4 — Examples of verification criteria and methods

Quality statement	Verification criteria	Possible verification methods
This milk is in compliance with market access requirements of country B and relevant technical standards or specifications for pasteurized milk	1. Production meets relevant standards or specification requirements 2. Storage and transport meet relevant requirements	Certification scheme applied to either pasteurized milk or the milk producer, or both, Check of temperature records
Country of origin for this milk is country A	1. The milk is produced and imported from country A	Either: 1. check of import, export documents; or 2. field verification of production site; or 3. both.

6.2.5 Identifying critical tracking events (CTEs) and data collection criteria

The entry and exit points of the traceability chain are not always the start and end of the goods supply chain. Depending on quality statements, the entry and exit point can vary even for the same goods as in example in Table 5. For implementation of traceability, the participants should decide on:

a) CTEs from entry point to exit point to be recorded (see 6.3);

b) who collects which data;

c) how to record such data.

Data collected in each CTE includes basic information to maintain goods traceability (see 7.2) and additional information related to goods quality assurance (see 7.3).

Table 5 provides examples of entry and exit points.

Table 5 — Examples of entry and exit points

Quality statement	Entry point	Exit point
This milk is in compliance with market access requirements of country B and relevant technical standards or specification for pasteurized milk	Production of milk	Consumption of milk
Country of origin for this milk is country A	Export port	Import port

The traceability initiator decides on CTEs and the data collection requirements with the repository party and the traceability information providers.

6.2.6 Implementation

At the entry point of the traceability chain, a traceable object is given a unique identifier and collection of traceability data is conducted according to the decided requirements or criteria. When a traceable object moves along the supply chain, the information recorded at the entry point of the traceability chain is associated with the traceability information recorded in each CTE (see 6.3) by this unique identifier. When the recorded traceability information can fully verify the quality statement of the goods and meet the requirements of traceability information requester, the traceable objects can reach the exit point of the traceability chain.

Traceability partners can directly or indirectly participate in the process of traceability implementation.

6.2.7 Verification of quality statements

Quality statements are verified at the exit point of the traceability chain. Verification is done by retrieval of necessary data with the agreed methods (see 8.2 and 8.3). When necessary data is not available, measures listed in 6.2.4 can be applied.

The traceability information requester makes requests to either the repository party or the traceability information provider, or both, to retrieve necessary data for quality statement verification.

6.2.8 Providing statement verification results or traceability information to the information requester

Verification results can be communicated to the information requester, e.g. buyers, regulatory agencies, via goods traceability tags, websites, social media. Verification results can be presented in the form of a quality statement and its supporting information.

The traceability initiator and traceability information requester can decide together what and how to present this information. It is important to ensure that the message communicated is factual and the reliability of the quality statement can be proven.

6.3 Critical tracking events (CTEs)

A critical tracking event (CTE) is an active step in the E-commerce business process. CTEs provide an accurate and detailed view of the actual events that occur to the goods to be traced. In each CTE, necessary information should be recorded and shared.

CTEs are goods and process specific. Table 6 gives examples of possible CTEs and their descriptions in a common E-commerce business process, in which goods transacted on a platform are dispatched from upstream suppliers to overseas buyers through warehouse and logistics.

Table 6 — Examples of CTE and descriptions in the E-commerce supply chains

Key business process	CTEs	Notes	Reference to
Upstream supply	commissioning	business step of associating an identifier with goods to be sold a tag can be encoded and applied in this step, or previously encoded	ISO/IEC 19988
	stocking	business step of making goods available for order fulfilment	ISO/IEC 19988
	loading	business step of loading goods into a shipping conveyance	ISO/IEC 19988
	consigning	business step of shipping goods with a change of possession or ownership at the outbound side	ISO/IEC 19988
Platform transaction	goods information releasing	business step of releasing goods information by e-commerce operator	
	ordering	business step of buyer placing an order in an e-shop	
	paying	business step of buyer making payment through the internet via various ways	
Warehousing	arriving	business step of goods arriving at a location	ISO/IEC 19988
	unloading	business step of unloading goods from a shipping conveyance	ISO/IEC 19988
	storing	business step of moving goods to a storage location	ISO/IEC 19988
	picking	business step of picking goods for shipment to fulfil an order	ISO/IEC 19988
	collecting	business step of collecting goods picked up for next disposal	ISO/IEC 19988
	packing	business step of putting goods into a larger container-usually for shipping	ISO/IEC 19988
	unpacking	business step of removing goods or batches of goods from a larger container, usually after receiving or accepting	ISO/IEC 19988
	loading	see above	ISO/IEC 19988
	cycle-counting	business step of counting objects in order to obtain an accurate inventory	ISO/IEC 19988
	staging outbound	business step of moving goods from a facility to an area awaiting transport pick-up	ISO/IEC 19988
Logistics	departing	business step of goods leaving a location on their way to a destination	ISO/IEC 19988
	transporting	business step of moving goods from one location to another by logistic provider	ISO/IEC 19988
	arriving	see above	ISO/IEC 19988
	delivering	business step of sending goods to an intended destination for buyers	ISO/IEC 19988
	receiving	business step of goods being received at a location after quantity checking	ISO/IEC 19988
	accepting	business step of confirming the change of the ownership of the goods	ISO/IEC 19988
NOTE The CTEs that are commonly used in the global supply chains listed in Table 6 are referenced from the Core Business Vocabulary (CBV) of ISO/IEC 19988.			

Table 6 *(continued)*

Key business process	CTEs	Notes	Reference to
Customs clearance	customs declaring	business step of submitting goods customs clearance application in cross-border transactions	
	inspecting	business step of customs reviewing either goods documents or goods, or both, for authenticity of the transaction	ISO/IEC 19988
	permitting	business step of goods being allowed to pass through borders	
after-order-placement	cancelling	business step of withdrawing the order	
	returning	business step of sending back the purchased goods	
	refunding	business step of returning money to buyers	
	replacing	business step of exchanging for another new goods	ISO/IEC 19988
	repairing	business step of malfunctioning goods being repaired by a post-sales service	ISO/IEC 19988
NOTE The CTEs that are commonly used in the global supply chains listed in Table 6 are referenced from the Core Business Vocabulary (CBV) of ISO/IEC 19988.			

7 Traceability information

7.1 Overview

Two types of information are generally collected for the purpose of goods quality assurance in E-commerce transactions: basic information and additional information related to goods quality assurance. To establish traceability, participants in the supply chains should collect the basic information to identify when and where the traceable objects have been, who has retained the custody of the goods and the purpose of such activities. While collecting and recording the 5W's (Who, What, When, Where and Why), the participants also should collect and record data related to goods quality assurance to verify the goods quality statements. However, even for the same goods, the information required to verify different quality statements varies greatly. For example, to collect quality information for statements such as "Imported Pasteurized Milk," verification of "Pasteurized" would focus on quality risk points in the production and transport processes, while verification of "Imported" would require the collection of data related to country of origin.

7.2 Basic information

7.2.1 Structuring basic information

Basic information records each CTE (6.3) through the 5W's and provides links to quality assurance related information when appropriate and available. The conceptual model for basic information is shown in Figure 4.

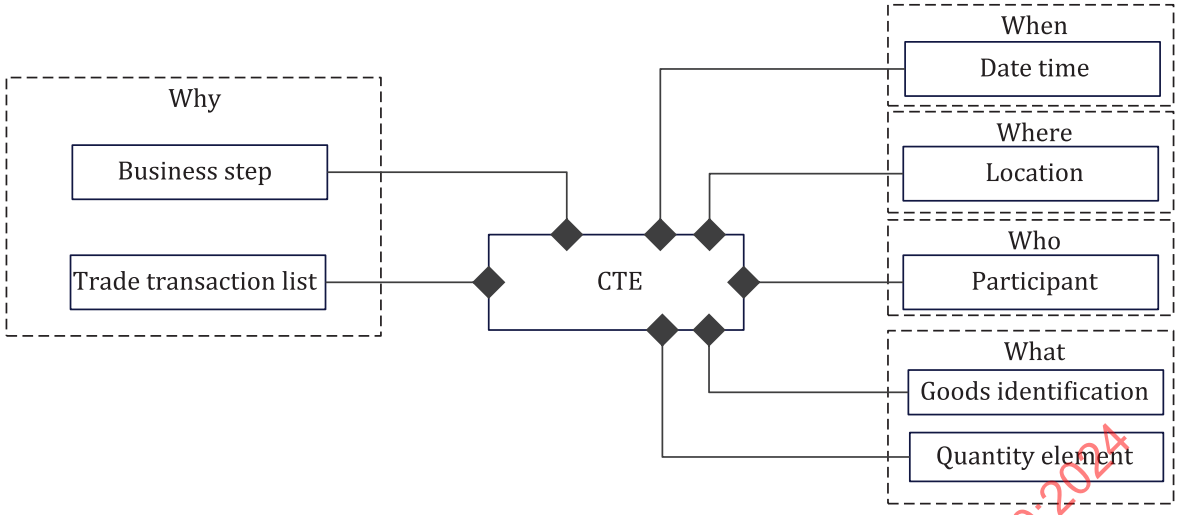


Figure 4 — Conceptual model for basic information

The "What" dimension identifies the traceable objects in the CTE and can contain record the following information:

— goods identifiers, which are uniquely assigned to the traceable objects, goods batch, lot or logistics (transport) unit;

— quantity element, which specifies how many or how much the traceable objects are and can include measurement units (e.g. mass, volume).

The "When" dimension identifies the date and time when specific events of the traceable objects move through the traceability chain. Recorded data can contain: date, time or time zone.

The "Where" dimension identifies the location where specific events occur. Recorded data can contain:

— business location, which describes where the traceable objects are located;

— read point, which describes where the event is captured.

The "Who" dimension identifies the participant of the traceability chain who is responsible for the specific event recorded. Recorded data can contain, for example, participants identifier, name, address, etc.

The "Why" dimension describes the business context in which the specific event occurs. Recorded data can include:

— business step, which identifies the specific business step in which the traceability information is captured, e.g. shipping, packing;

— transaction list, which identifies the business transaction relevant to a specific event, e.g. purchasing an order, dispatching an order.

ISO/IEC 19988 provides vocabularies common to many industries and augmentation methods to refer to when structuring basic information. The controlled vocabulary of the Core Component Library of UN/CEFACT [10] contains information on the structuring of basic information. Traceability participants should have a common understanding of the methods adopted.

7.2.2 Examples of basic information

For CTEs illustrated in the E-commerce process in 6.3, the basic information can be structured as given in Table 7.

Table 7 — Basic information for CTEs

Business process	CTE	Basic information				
		Who	What	When	Where	Why
upstream supply	commissioning	related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of commissioning	location and identification when commissioning	[business step] commissioning
	stocking	order ID	goods ID, batch/lot ID, goods quantity	date and time of stocking	location and identification of stocking	[business step] stocking [business transaction] order, dispatch advice
	loading	related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of loading	location and identification when loading	[business step] loading
	consigning	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of consigning	location and identification when consigning	[business step] consigning [business transaction] consigning order
platform transaction	goods information releasing	seller's ID	goods ID	date and time of releasing	operator interface or system platform provided for seller, e.g. seller central	[business step] information releasing
	ordering	buyer's ID	goods ID, goods quantity	date and time of ordering	operator interface or system platform provided for seller, e.g. seller central	[business step] retail selling [business transaction] order ID, dispatch advice
	paying	payment service provider's ID	goods ID, goods quantity	date and time of paying	operator interface or system platform provided for seller, e.g. seller central	[business step] paying [business transaction] payment order
warehousing	arriving	ID of logistics service provider, warehouse's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of arriving	location and identification of arriving	[business step] arriving [business transaction] shipping order
	unloading	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of unloading	location and identification of unloading	[business step] unloading
	storing	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity or goods ID, batch/lot ID,	date and time of storing	location and identification of storing	[business step] storing
	picking	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of picking	location and identification when picking	[business step] picking
	collecting	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of collecting	location and identification of collecting	[business step] collecting
	packing	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity or goods ID, batch/lot ID	date and time of packing	location and identification when packing	[business step] packing
	unpacking	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity or goods ID, batch/lot ID	date and time of unpacking	location and identification when unpacking	[business step] unpacking
	loading	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity or goods ID, batch/lot ID	date and time of loading	location and identification of loading	[business step] loading
	cycle-counting	warehouse's ID, related operator's ID	goods ID, batch/lot ID, goods quantity	date and time of counting	location and identification of overseas warehouse	[business step] cycle-counting
	staging outbound	warehouse's ID, related operator's ID	goods ID, batch/lot ID	date and time of staging outbound	location and identification of staging outbound	[business step] staging outbound
logistics	departing	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of departing	location and identification of departing	[business step] departing [business transaction] Waybill ID (tracking number)

Table 7 *(continued)*

Business process	CTE	Basic information				
		Who	What	When	Where	Why
	transporting	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID,	date and time of transporting	location and identification when transporting	[business step] transporting [business transaction] Waybill ID (tracking number)
	arriving	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of arriving	location and identification when arriving	[business step] arriving [business transaction] arriving ID (tracking number)
	delivering	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of delivering	location and identification when delivering	[business step] delivering [business transaction] Waybill ID (tracking number)
	receiving	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of receiving	location and identification when receiving	[business step] receiving [business transaction] Waybill ID (tracking No.)
	accepting	consignor's ID, logistics provider's ID, consignee's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of accepting	location and identification when accepting	[business step] accepting [business transaction] receipt order
customs clearing	customs declaration	customs applicants' ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of declaration	declaration system of the customs office, e.g. single window	[business step] customs declaration [business transaction] ID of customs declaration
	inspecting	ID of customs port	goods ID, batch/lot ID, goods quantity	date and time of inspecting	location and identification when inspecting	[business step] inspecting
	permitting	ID of customs port	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of clearing	declaration system of the customs office, e.g. single window	[business step] clearing
after-order-placement	cancelling	buyer's ID	goods ID, goods quantity	date and time of cancelling	operator interface or system platform provided for seller, e.g. seller central	[business step] refunding [business transaction] Cancellation No.
	returning	buyer's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of returning	operator interface or system platform provided for seller, e.g. seller central	[business step] returning [business transaction] return order number
	refunding	buyer's ID	goods ID, goods quantity	date and time of refunding	operator interface or system platform provided for seller, e.g. seller central	[business step] refunding [business transaction] refund order number
	replacing	buyer's ID	goods ID, batch/lot ID, logistics (transport) unit ID, goods quantity	date and time of replacing	operator interface or system platform provided for seller, e.g. seller central	[business step] replacing [business transaction] replacing order number
	repairing	buyer's ID	goods ID, batch/lot ID, goods quantity	date and time of repairing	location and identification of repairing	[business step] repairing [business transaction] refund order number

7.3 Additional information

7.3.1 Structuring additional information

7.3.1.1 Overview

Additional information is goods quality assurance related information. It includes goods characteristics information related to the goods quality statement and quality statement verification information. Additional information related to goods quality assurance contains multiple attributes. However, it generally does not involve all attributes when sharing and exchanging information. What to share and exchange depends on the

requirements of goods traceability. A reference conceptual model for goods quality assurance information is shown in Figure 5.

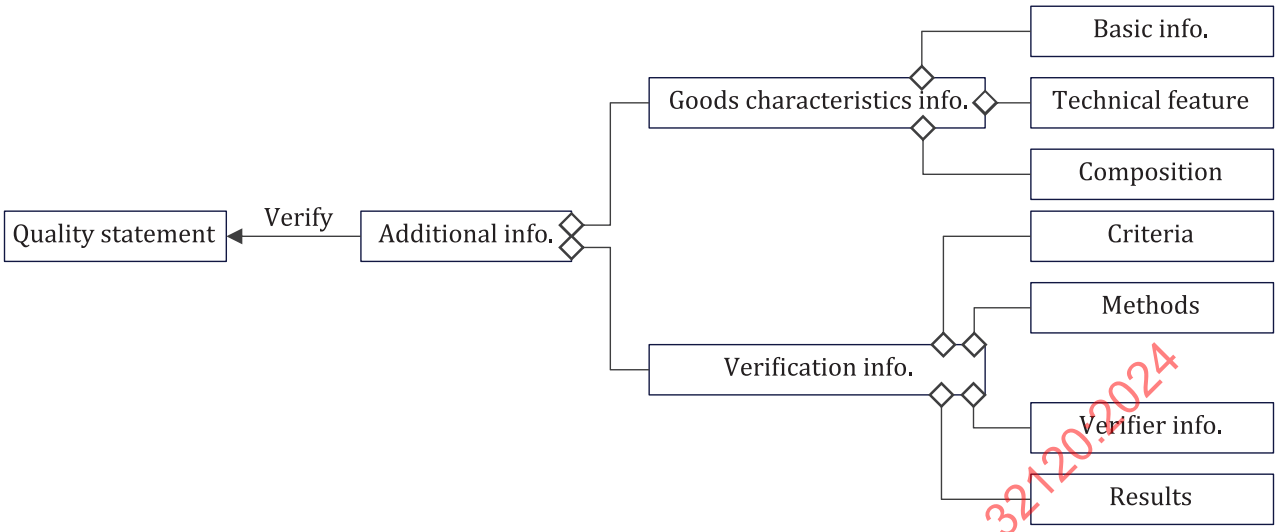


Figure 5 — Reference conceptual model for goods quality assurance information

7.3.1.2 Goods characteristics information

Goods characteristics information contains goods quality related information released online, of which the main attributes can include:

— goods basic information, e.g. goods category, brand, country of origin;

— technical features, e.g. scope of application, functionality;

— composition, e.g. ingredients, critical components, materials.

7.3.1.3 Goods quality statement verification information

Goods quality statement verification information verifies the compliance and consistency of the goods and can include:

— verification criteria, e.g. information about goods laws, regulations, standards;

— verification methods (see 6.2.4);

— verifier's information, e.g. name, address, qualification information of the organization or individual performing the verification;

— verification results, e.g. conclusion, scope of application and validity period of conclusion.

7.3.2 Goods quality assurance related information entities

Goods quality assurance related information can be structured into the following information entities:

a) Certificates

The certificates used to verify goods quality statements typically include goods certificates and organization certificates. A goods certificate is issued for goods or batches of goods. It is issued after the certification activity is performed according to specific standards or technical specifications. An organization certificate is issued to an organization, such as a manufacturer, a seller and a transport and warehousing organization. It is the proof that the related organization has the ability to continuously guarantee the specific quality characteristics of the goods. Examples of such certificates include quality management system certificates and food production licenses. Figure 6 gives an example of a certificate with its main attributes.

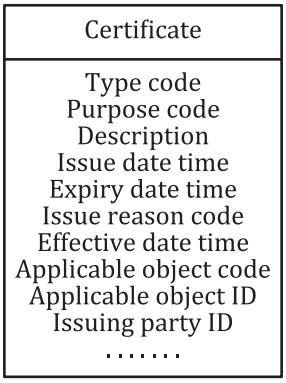


Figure 6 — Example of goods quality certificates

b) Reports

The reports used to verify goods quality statements typically include test reports and inspection reports. A test report is a record of the evaluation of one or more quality characteristics of goods or batches of goods according to specific standards or technical requirements. An inspection report evaluates the good's compliance according to relevant standards, purchase orders, traceability requirements, etc. Figure 7 gives an example of a report with its main attributes.

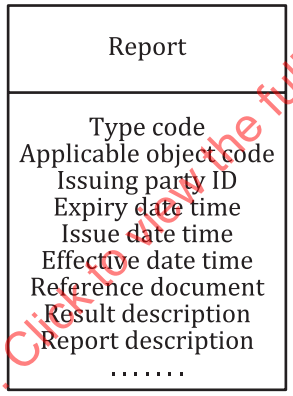


Figure 7 — Example of goods quality report

c) Records

Records provide values and changes in values that are directly related to the quality of the goods. For example, temperature, pressure and other characteristics associated with the quality of goods can be recorded.

Records of oxygen amount in live fish transportation is given as an example in Table 8.

Table 8 — Example of goods quality record

Record ID	Type code	Value	Unit	Date/Time	Lower limit	Tolerance	Reference number of recorder	Method
1234565762345	001	3,5	mg/l	2020-12-12 01:23:00	6	±0,1	oxygen recorder 001	sampling01
1234565762346	001	3,6	mg/l	2020-12-12 01:24:00	6	±0,1	oxygen recorder 001	sampling01
1234565762349	001	.....	.....	.....	.....	.....	.....	.....

Goods quality assurance related information is goods specific. Augmentation of information entities should refer to existing relevant standards. UN/CEFACT standards of e-cert and e-quality can also be referred to for information entities used for goods quality assurance.

7.4 Linking traceability information

As the traceable objects move through the E-commerce supply chains, basic information recorded at each CTE should be linked to create traceability chains. Meanwhile, basic information should provide links with additional quality information to identify where further information to verify the quality statement can be found. The linkage is created through the association between unique IDs of different business information entities. Traceability business information entities mapping applied in E-commerce can be:

— One-to-one mapping, in which a business information entity links with another unique one. For example, the “manufacturer ID” is linked with the “organization certificate” ID.

— One-to-many mapping, in which a business information entity links with multiple other business information entities. For example, one “goods ID” is linked to multiple “testing reports” IDs.

There are many globally applicable standards, such as ISO/IEC 15459-3 and DIDs[14], among others, that have specified the common rules applicable for unique identification for goods or items, using a barcode or other media attached to, or incorporated into them (e.g. EPC/RFID tags, QR labels). There are different issuers of unique IDs. It is possible for traceability partners in E-commerce to use any coding systems as their internal IDs, but for the purpose of information sharing via a traceability system, internal IDs should be transformed into a compatible unique ID, such as GS1, to achieve interoperability and mutual understanding.

8 Sharing of information

8.1 Overview

For goods quality assurance, E-commerce participants should share traceability information with each other. It is possible that some of them have no direct trading relationships. Therefore, all participants should have a common understanding about where necessary data can be stored and how it can be communicated with each other.

In E-commerce traceability, basic information can be recorded and searched in a shared data repository by all participants. Quality assurance related information can be recorded in a controlled data repository by each responsible participant, who has access control and provides such information upon requests.

8.2 Sharing basic information

Figure 8 illustrates the process of sharing basic information.