The GS1 Traceability Standard:
What you need to know

| 1 PLAN & ORGANISE | 2 ALIGN MASTER DATA | 3 RECORD TRACEABILITY DATA | 4 REQUEST TRACE | 5 USE INFORMATION |

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Contact

GS1 Global Office
Blue Tower
Avenue Louise, 326 bte 10
B-1050 Brussels Belgium
Tel : +32 2 788 78 00
Fax : +32 2 788 78 99
Web Site : www.gs1.org/traceability

The GS1 Traceability Standard: What You Need to Know

Executive Summary

Traceability is the ability to identify the past or current location of an item, as well as to know an item's history.

The most well known use of traceability is locating defective or unsafe foods, pharmaceuticals or other products, in order to remove them promptly from shelves. In some cases, being able to quickly and easily recall an item (or a group of items) can save lives. Speedy recall also greatly reduces the potential negative economic impact, and preserves consumers' trust in the quality of their favorite brands and their confidence in the systems that are designed to protect their safety.

There is however more to traceability than just recall. For example, traceability systems can validate the presence or absence of attributes important to consumers, such as organic farming methods, kosher foods, non-allergenic cosmetics, or sugar-free products. Traceability has become a tool in fighting product counterfeiting and protecting brands. Recently, it has also become a regulatory requirement in some countries in the fight against bioterrorism.

Implementing a traceability system within a supply chain requires all parties involved to systematically link the physical flow of materials and products with the flow of information about them. This requires a holistic view of the supply chain, which is best attained by deploying a common business language.

While businesses recognise the value of traceability, they do not want multiple, potentially conflicting traceability systems, and they do not want to increase costs unnecessarily. Businesses also recognise that an individual company is only one partner in the supply chain, and that a chain is only as strong as its weakest link. In short, businesses want a traceability system that can easily be adopted by just about everyone in the supply chain.

The **GS1 Traceability Standard** meets this criterion. It defines business rules and minimum requirements to be followed when designing and implementing a traceability system. GS1 standards (*such as GS1 BarCodes, GS1 EPC, GS1 eCom business messaging, and more*) enable the easy implementation of this GS1 Traceability Standard.

This document provides basic information about
- participants in the traceability process, both parties and roles
- definitions of traceable items
- GS1 global unique identifiers to use on each type of traceable item
- sub-processes and steps of the traceability process

GS1 in a Nutshell

GS1 is a neutral, not-for-profit organisation dedicated to the design and implementation of global standards, technologies and solutions to improve the efficiency of supply and demand chains by adding useful information to any exchange of goods or services.

It was formed from the joining together of EAN International and UCC, the Uniform Code Council, and is today the most widely used supply chain standards system in the world.

GS1 has more than 30 years experience and is present in over 145 countries. More than a million companies representing all points in the supply and demand chain and executing over five billion transactions every day drive the organisation's activities.

It operates in more than 20 sectors, including fast-moving consumer goods, healthcare, transport and logistics, and defense. GS1 works with small and mid-sized firms, as well as many of the world's largest corporations.

GS1's integrated system of standards is the foundation for accurate identification and communication of information regarding products, assets, services and locations.

GS1's **products** include:
- **GS1 BarCodes:** global standards for rapid and automatic identification of items and assets, or their location
- **GS1 eCom,** global standards for electronic business messaging and the rapid and accurate exchange of data between businesses
- **GS1 GDSN**, a standardised global environment for data synchronization between business partners
- **GS1 EPCglobal**, global standards for RFID-based identification of items and assets.

GS1 also offers **solutions**, which combine a number of GS1 products, such as:
- **GS1 Traceability**, for tracking and tracing items such as food or pharmaceuticals through the supply chain.
- **GS1 Patient Safety**, to ensure prevention of medical errors and counterfeiting across the healthcare supply chain.

Furthermore, GS1 offers a wide range of **services** to help businesses implement and use its standards, including training, certification, technical support and implementation advice.

GS1's 104 **Member Organisations** are national associations that provide tools and support to companies in that country. GS1 Member Organisations, for example, allocate the unique numbers that are the very basis for the GS1 System of standards.

For more information, visit www.gs1.org

Understanding Traceability

Traceability is the ability to trace the history, application or location of that which is under consideration.

The GS1 Traceability Standard is a business process standard, which:

- defines the traceability process
- defines minimum traceability requirements for all sectors and all types of products
- identifies existing GS1 standards

The principles of traceability can apply to any industry served by GS1.

Traceability Across the Supply Chain

Traceability management across the supply chain involves the association of a flow of information with the physical flow of traceable items (*see Figure 1.*) Each actor must perform different roles within the supply chain, but all actors must follow the basic agreed-to steps of the traceability process.
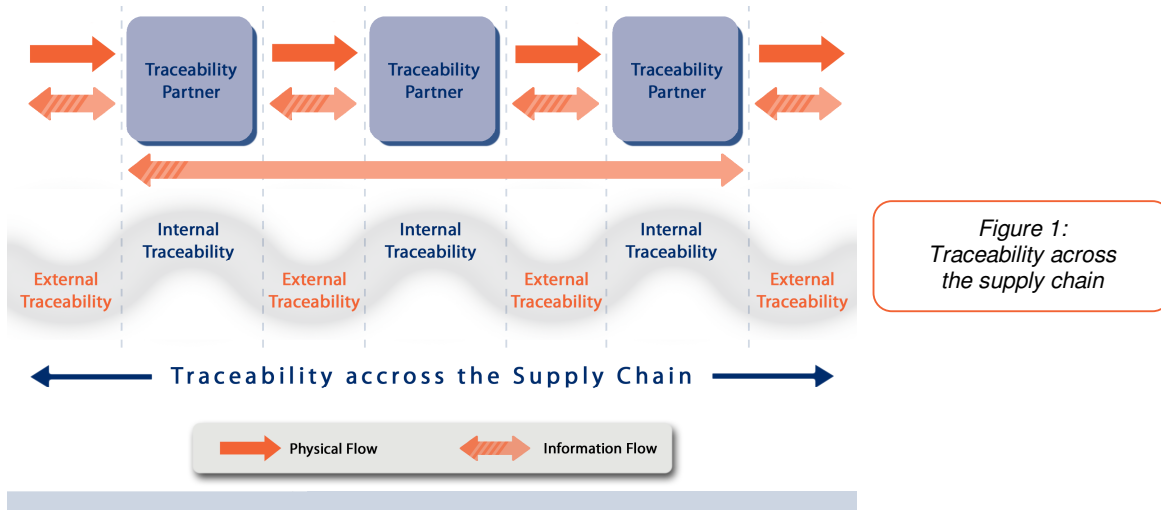

Figure 1:
Traceability across the supply chain

In order to achieve traceability across the supply chain, all traceability partners must achieve **internal** and **external** traceability.

Internal Traceability

Internal traceability takes place when a Traceability Partner receives one or several instances of traceable items as inputs that are subjected to internal processes, before one or more instances of traceable items are output (*see Figure 2.*)

Receive .... Process .... Despatch

Traceable Item

Traceable Item

Internal Process

Traceable Item

Traceable Item

Traceable Item
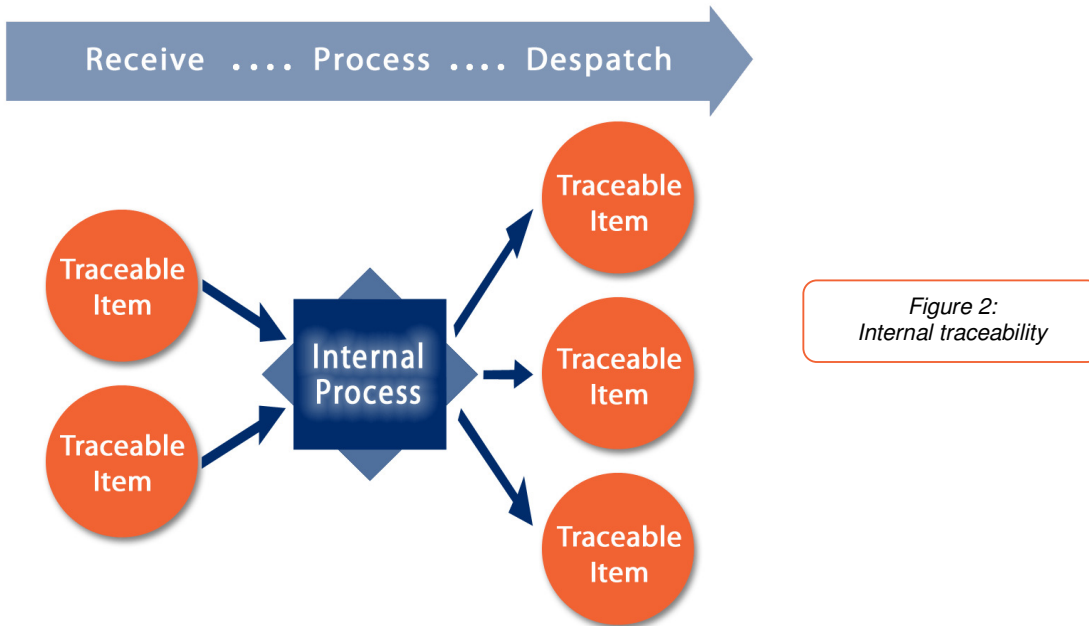
Figure 2:
Internal traceability

An internal process is one or more sub-processes performed by the same party, or without a significant involvement of other trading partners.

At a minimum, the internal process must consist of one of the four following sub-processes:
- movement
- transformation
- storage
- destruction

Every Traceability Partner has a responsibility to maintain data that links input into a transformation process with the output, and that links the original and final location after movement.

This standard recommends the use of GS1 global standards to capture the data that links inputs during a product's internal life cycle.

External Traceability

External traceability takes place when a traceable item is physically handed over from one Traceability Partner to another (*see Figure 3*.)

Figure 3:
External traceability

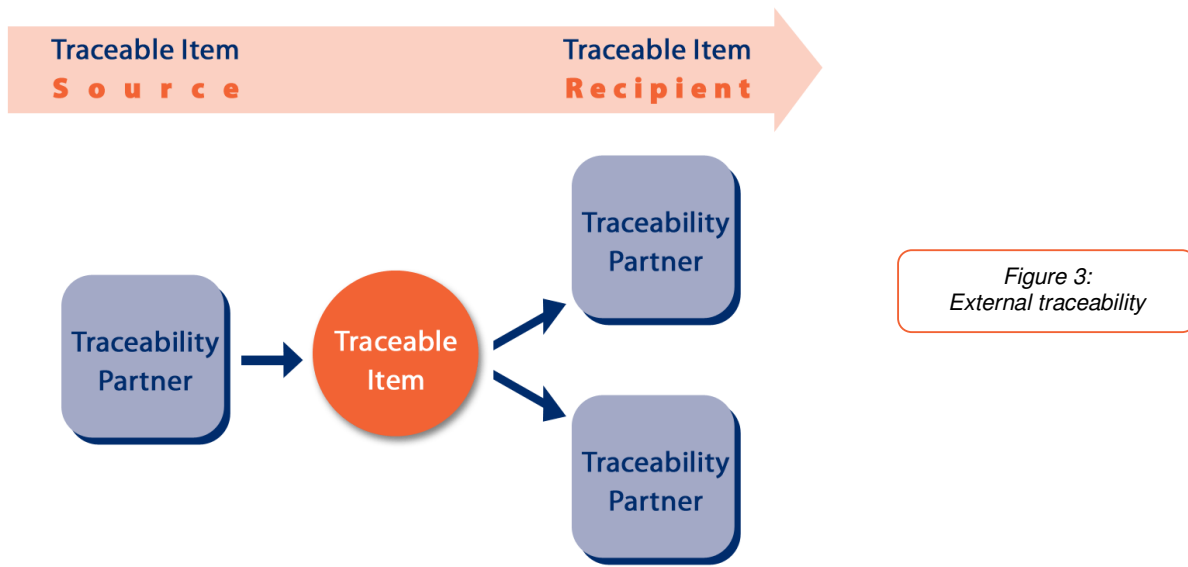Each Traceability Partner should be able to trace back to the direct source and be able to identify the direct recipient of the traceable item: This is the "**one step up, one step down**" principle.

Traceability does not mean that every Traceability Partner must hold and publish all traceability information: however, the Traceable Item Source and Traceable Item Recipient must communicate and record the identification of at least one common level of traceable item within their respective systems. This ensures efficient information flow of data when tracing back or tracking forward.

All traceable items must carry identification and be labelled, marked or tagged at the source (or at their creation). This standard recommends the use of a Global Trade Item Number (GTIN) or Serial Shipping Container Code (SSCC) for this.

The Brand Owner must ensure the true uniqueness of the identification of the traceable item. When sub-contractors or licensees are involved, it is up to the Brand Owner to find a way to ensure uniqueness, and may depend on contractual agreements.

The identification carrier (mark, tag, label, accompanying document) must remain on the traceable item or attached to it until the traceable item is consumed or destroyed.

Traceability Process Participants

The GS1 Traceability Standard distinguishes between parties and roles. A party is a generalization of a legal or physical entity (for example, a retailer). A role is a specific function of a party in a specific process at a specific time (for example, a buyer).

Who are the parties in the traceability process?

Trading Partners can be distinguished as following parties:
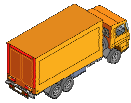
Carrier/Third Party Logistics Provider (3PL)
The party responsible for the delivery or shipping of the traceable item.

Processor/Manufacturer/Primary Producer
Typically receives inputs and transforms those inputs. Examples include the farmer, an abattoir or a packer that consolidates product form a number of growers, and a food manufacturer that processes food ingredients into a finished product. A supply chain may be comprised of more than one processor/manufacturer/primary producer.

Retailer/Point of Sale or Service Operator
Has the final relationship with the consumer. For example, a retailer, healthcare provider, institution, or hospitality service such as a hotel or restaurant.
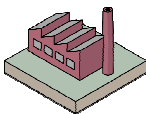
Warehouse/Distribution Centre
Responsible for the handling (may transform the traceable item) and storage of the traceable item.

Authorities
The party legally mandated to protect the public interest.

The same legal entity can be more than one party. For example a Third Party Logistics Provider may also act as a Warehouse or Distribution Centre. Indeed, parties in the supply chain often play multiple roles in the traceability process.

What are the roles the parties might play in the traceability process?
Different parties have roles depending on the physical and information process flows.

Information process flow role
Trading Partners can be distinguished as following roles in information process flow:

Brand Owner
- The party that is responsible for allocating GS1 System numbering and bar code symbols on a given trade item. The administrator of a GS1 Company Prefix.
- And/or the party that is the ultimate authority for the trade item.
- And /or the owner of the product specifications.
- And/or responsible for placing a traceable item into commerce.

Traceability Data Creator
The Traceability Partner that generates traceability information.

Traceability Data Source
The Traceability Partner that provides the traceability information.

Traceability Data Recipient
The Traceability Partner authorized to view, use, and download traceability information.

Trace Request Initiator
The person who starts the trace request.

Physical process flow roles
Trading Partners can be distinguished as following roles in physical process flow:

Traceable Item Creator
The Traceability Partner that generates a traceable item, or makes a distinct traceable item by transformation of one or more traceable items.

Traceable Item Source
The Traceability Partner that despatches or provides a traceable item.

Traceable Item Recipient
The Traceability Partner that receive the traceable item.

Transporter
The Traceability Partner that receives, carries, and delivers one or more traceable items from one point to another without transforming the traceable item(s). Typically only has possession, custody, or control of a traceable item, but may have ownership.

What is a traceable item?

A traceable item is a physical object where there may be a need to retrieve information about its history, application, or location.

The level at which the traceable item is defined within a product packaging or logistical hierarchy is dependent on the industry and degree of control required.

A traceable item from the **highest** level to the **lowest**, may be a:
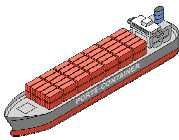
Shipment
- May contain one or more logistic unit(s)
- Examples include truckload, vessel, 10 pallets of various items.
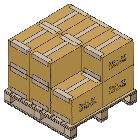
Logistic unit
- May contain other logistic unit(s)
- May contain one or more trade item(s)
- May be a trade item
- Examples include pallet, container.

Trade item not crossing the POS
- A trade item
- Batch/lot of trade items
- Serialized trade item
- Examples include carton, bag.

Trade item crossing the POS
- Examples include consumer units.

How are traceable items identified?

All traceable items must carry a global, unique identification **directly on the traceable item**, or if not possible, at least on the asset containing it, or on an accompanying document.

Which GS1 global unique identification should be used?

The GTIN is the basis for product identification, which serves as a reference to the full body of product information. For the purpose of traceability, this may not be sufficient, requiring additional information to uniquely identify a product or grouping of products. *(See Figure 4.)*

Precision of the identification

	Shipment	Logistic Units	Trade item not crossing the point of sale	Trade item crossing the POS, Consumer Unit
Unique (serialized)	Shipment Identification Number (SIN)	SSCC	GTIN + Serial Number SGTIN	GTIN + Serial Number SGTIN
Specific (batch)	Not Applicable	Not Applicable	GTIN + Batch / Lot Number	GTIN + Batch / Lot Number
Generic	Not Applicable	Not Applicable	GTIN	GTIN

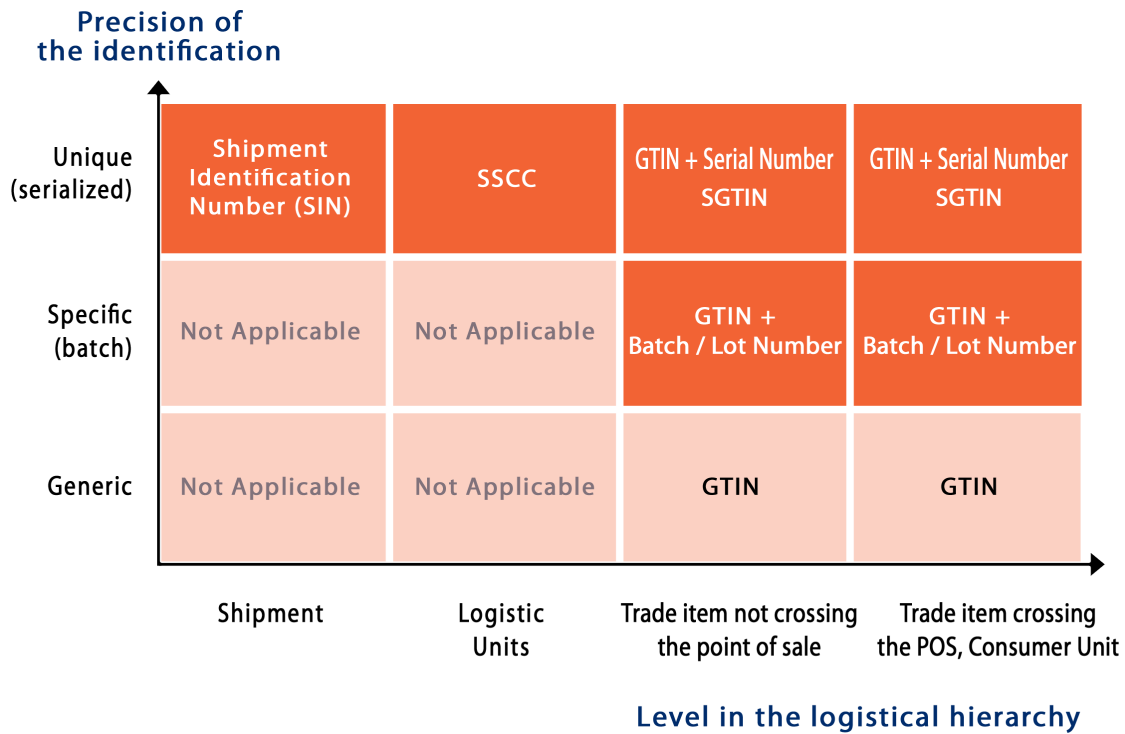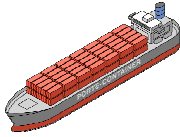**Level in the logistical hierarchy**

Figure 4:
Traceable item matrix

More information on using GS1 global unique identifiers

If the traceable item is a shipment:
- At a unique (serialized) level of identification, Shipment Identification Number (SIN) shall be used, e.g., bill of lading number, despatch advice number, invoice number, packing slip number, container number, proof of delivery.
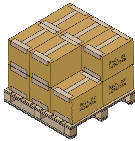
If the traceable item is a logistic unit:
- The Serial Shipment Container Code (SSCC) shall be used.

If the traceable item is a trade item not crossing the POS:
- At a generic level of identification, GTIN for Grouping of Trade Items shall be used.
- At the specific (batch) level of identification, GTIN + Batch/Lot shall be used.
- At the unique (serialized) level of identification, GTIN + Serial number (SGTIN) shall be used.

If the traceable item is a trade item crossing the POS :
- At a generic level of identification, GTIN for Consumer Unit shall be used.
- At a specific (batch) level of identification, GTIN + Batch/Lot shall be used.
- At a unique (serialized) level of identification, GTIN + Serial number (SGTIN) shall be used.

Assumptions for the traceable item matrix/hierarchy:
- All traceable items may need to be **physically marked** with a batch or lot number to comply with legal requirements, e.g., food products.
- Where appropriate, **a Best Before Date** (e.g., food) or **Expiry Date** and **Batch/Lot Number** (e.g. pharmaceuticals) should be added.
- As the level of precision required is increased, it may be appropriate to identify traceable items with a **Serial Number**, e.g., a car, a washing machine, a personal computer.
- A **Serial Number** may be appropriate for trade items not crossing the point of sale (cases of consumer units) that need to be traced at this level, e.g., a tray of fruit or vegetables, a carton of meat.

When the logistic unit is a trade item, it is also identified with a GTIN and cumulates the corresponding identification standards from both "Logistic Unit" and "Trade Item not crossing the point of sale".

Traceability Data

Traceability data can be **master** or **transactional** data depending on product type, and can be **public** or **private** information depending on contractual relationship *(see Figure 5.)*
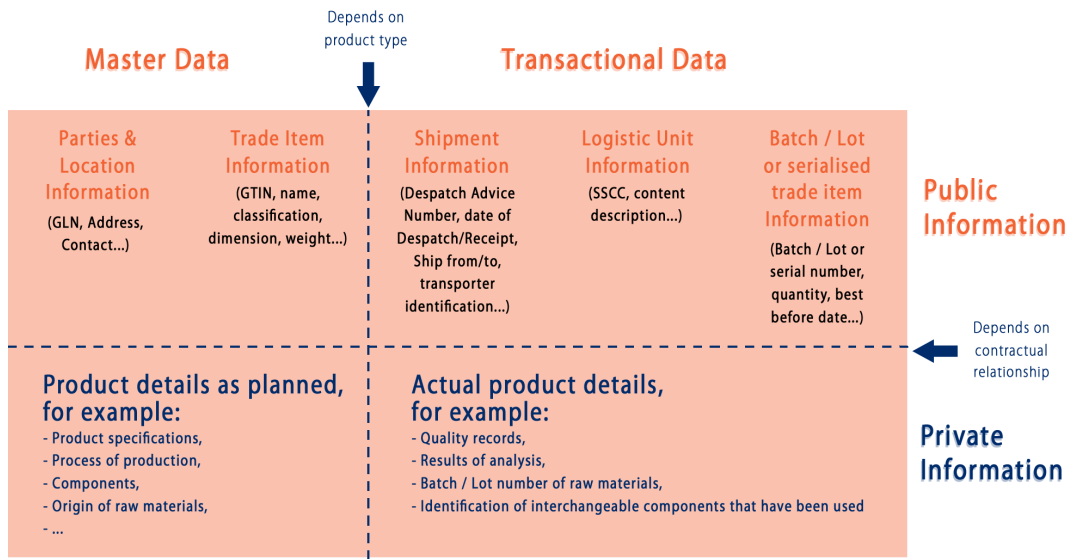
Depends on product type

Master Data **Transactional Data**

Parties & Location Information (GLN, Address, Contact...)	Trade Item Information (GTIN, name, classification, dimension, weight...)	Shipment Information (Despatch Advice Number, date of Despatch/Receipt, Ship from/to, transporter identification...)	Logistic Unit Information (SSCC, content description...)	Batch / Lot or serialised trade item Information (Batch / Lot or serial number, quantity, best before date...)

Public Information

Depends on contractual relationship

Product details as planned, for example:
- Product specifications,
- Process of production,
- Components,
- Origin of raw materials,
- ...

Actual product details, for example:
- Quality records,
- Results of analysis,
- Batch / Lot number of raw materials,
- Identification of interchangeable components that have been used

Private Information

Figure 5: Traceable data matrix

Master Data

Master data has the following characteristics:
- Permanent or lasting nature
- Relatively constant across time, not subject to frequent change
- Accessed or used by multiple business processes and system applications
- Can either be neutral or relationship dependent
- Master data describes:
  - Trade item information (GTIN, name, classification, dimensions, weight…)
  - Parties & location information (GLN, address, contact…)
  - Product details as planned (product specification, process of production, components, origin of raw materials…)

Transactional Data

Transactional data is created during the physical flow of goods. It can only be collected when events occur. Transactional data refers to:
- Shipment information (Despatch Advice number, date of dispatch/receipt, Ship from/to, transporter identification…)
- Logistic Unit (SSCC, content description…)

- Batch/lot or serialised trade item information (Batch/lot or serial number, quantity, best before date…)
- Actual product details (quality records, results of analysis, batch/lot number of raw materials, identification of interchangeable components that have been used)

Public Data

Public information may be in the traceability records of the traceable item holders (successive traceable item sources and recipients). Public data may be:
- Parties & location information
- Trade item information
- Shipment information
- Logistic Unit information
- Batch/lot or serialized trade item information

Private Data

Private information is likely to be in the traceability records of one of the previous or subsequent trading partners. Private data may be:
- Product details as planned
- Actual product details

Minimum Data Requirements for Traceability

For a global traceability process, a minimum amount of traceability data must be exchanged to accompany the physical flow of goods. Each industry should consider whether an extension to this generic standard is required to meet their specific data requirements.

The minimum information required, and corresponding data elements:

Who is my Traceability Partner?
Parties may serve as a:
- Traceable Item Source, often as Traceability Data Source (GLN)
- Traceable Item Recipient, often as Traceability Data Recipient (GLN)

What is the Traceable Item?
The data elements required are dependent on the level of traceable item chosen:

When the Traceable Item is a Trade Item:
- Trade Item Identification (GTIN)
- Trade Item Description (GDD)
- Trade Item Quantity

When the Traceable Item is a batch of trade item:
- Trade Item Identification (GTIN + Batch/Lot Number)
- Trade Item Description (GDD)
- Trade Item Quantity

When the Traceable Item is a serialised of trade item:
- Trade Item Identification (GTIN + Serial Number)
- Trade Item Description (GDD)
- Trade Item Quantity

When the Traceable Item is a Logistic Unit:
- Logistic Unit Identification (SSCC + Application Identifiers)
- Logistic Unit Quantity

When the Traceable Item is a Shipment:
- Shipment Identification (Shipment Identification Number, SIN)

Where was it shipped from or shipped to?
- Best practice or specific extensions of traceability requirements: "ship from" or "ship to " identification (GLN).

When did I receive/dispatch it?
- Date of receipt and/or date of dispatch as relevant depending on the role of the party (DESADV)

In order for traceability to be effective along the supply chain, and the above data elements to be truly useful, each Traceability Partner must practice **internal traceability**. *(See definition, page 5.)*

The Traceability Process

The GS1 standard traceability process is composed of five sub-processes and eighteen steps.

This section will explain in more details these sub-processes and steps.

Note: In the explanation, the word "**MUST**," "**REQUIRED**" and "**SHALL**" mean that the definition is an absolute requirement of the specification. The words "**MAY**" or the adjective "**OPTIONAL**" means that the action is truly optional.

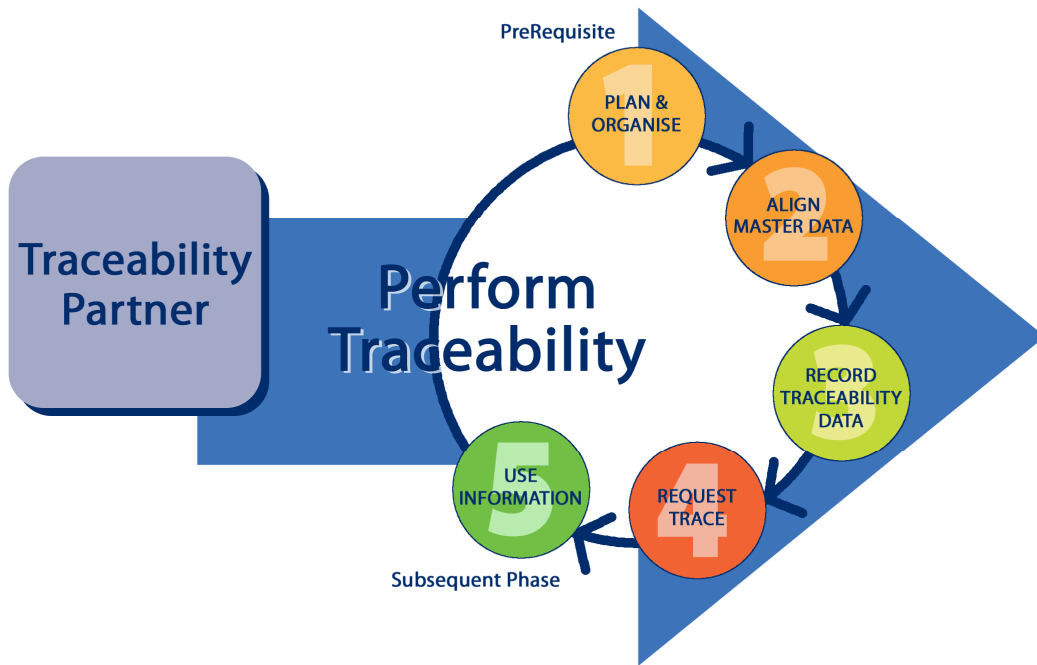The process of performing traceability can be visualised as shown in figure 6 below:

Figure 6:
The traceability process

Five Sub-processes (composed of Eighteen Steps)

Sub-process 1: Plan and Organise

Sub-process 1 of the traceability process determines how to assign, collect, share, and keep traceability data. Furthermore, it determines how to manage links between inputs, internal processes, and outputs. It is a prerequisite phase.

This sub-process begins when Trading Partners decide to achieve traceability.

Step 1: Determine how to assign, collect, share and keep traceability data.
The Primary Actor is the Traceability Partner.

Step 2: Determine how to manage links between inputs, internal processes and outputs.
The Primary Actor is the Traceability Partner.

Sub-process 1 ("Plan and Organise") ends when number assignment, collecting, sharing, keeping and linking methods are decided. The output of this sub-process is that Traceability Partners have made their plan and organisation for traceability.

Sub-process 2: Align Master Data

Sub-process 2 determines how to assign identifications to the parties and physical locations, trade items and if appropriate to assets. It also determines how to exchange master data with trading partners. The recommendation is to align master data that is public **before** the physical flow begins. *See Figure 7.*

Step 3: Assign identification to the party.
The Primary Actor is the Traceability Partner. Trading Partners **MUST** be globally and uniquely identified. The corresponding GS1 Standard is the GLN.

Step 4: Assign identification to physical locations.
The Primary Actor is the Traceable Item Source and Traceable Item Recipient. Secondary Actors are Traceable Item Creator, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, and Traceability Data Recipient. Any internal or external location that needs to be traced **MUST** be globally and uniquely identified. This may be at a high level (warehouse location), but could be at the detail level (precise bin location) within a warehouse. The corresponding GS1 Standard is the GLN.

Step 5: Assign identification to the assets.
The Primary Actor is the Traceability Partner. Any asset, which needs to be traced forward or traced back, **MUST** be globally and uniquely identified. Corresponding GS1 Standards are the GIAI and if asset is returnable, the GRAI.

Step 6: Assign identification to the trade item.
The Primary Actor is the Brand Owner. Any trade item that needs to be traced forward or traced back **MUST** be globally and uniquely identified. This applies to any level of the product hierarchy, for example, consumer unit or a trade item not crossing the point of sale. The corresponding GS1 Standard is the GTIN.

Step 7: Exchange master data.
The Primary Actor is the Traceability Partner.

Sub-process 2 ("Align Master Data") ends when master data alignment has been achieved.

The output of this sub-process is that all Traceability Partners have aligned their master data.

Figure 7:
Align master data
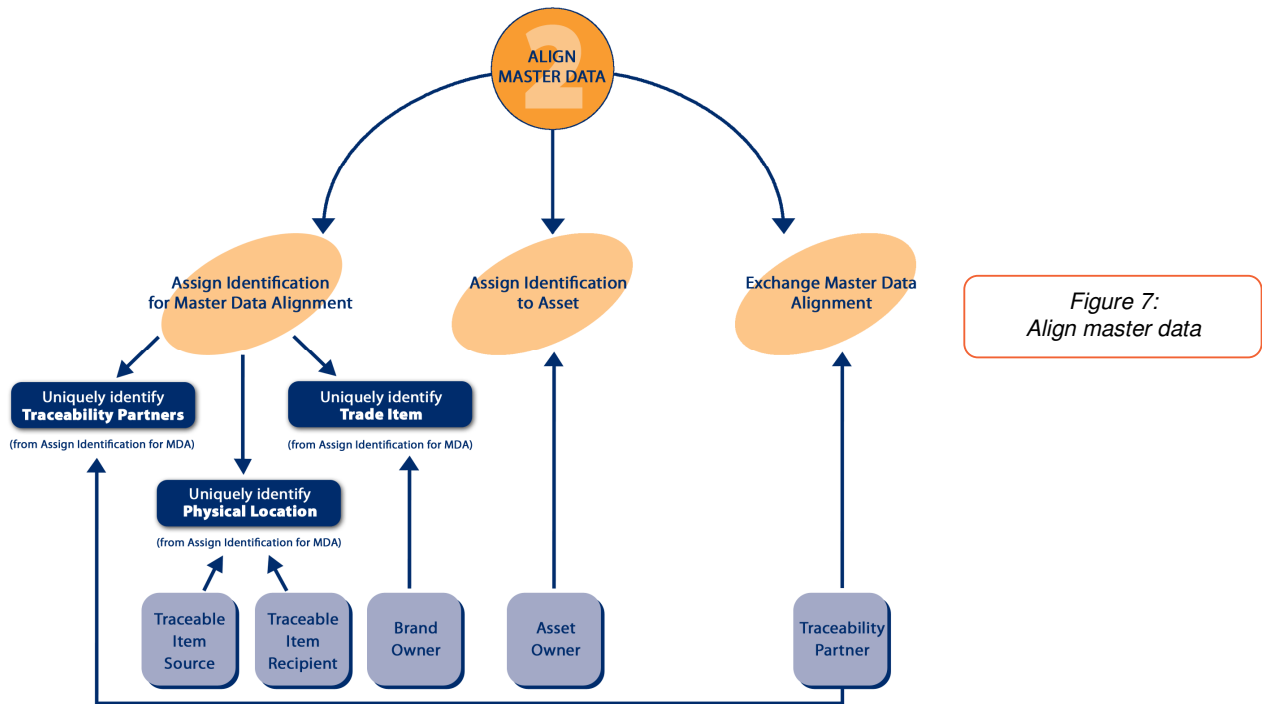
Sub-process 3: Record Traceability Data

This sub-process determines how to assign, apply and capture traceable items identification and how to collect, share and store traceability data during the physical flow. *See Figure 8.*

It begins when a manufacturer needs to create inventory, or a vendor-managed inventory triggers an inventory creation request.

Step 8: **Assign identification to traceable item when it is created.**
The Primary Actor is the Traceable Item Creator. The Secondary Actors are Brand Owner and Traceability Data Creator. The Brand Owner **MUST** ensure the unique identification of the traceable item. The identification of the traceable item **MUST** be assigned, at the latest, when physically created. Traceability Partners **MUST** agree on what the common level of traceable item is and for this common level agree on the set of consistent traceability data to be exchanged.

- ✓ When the traceable item is a **trade item**:
  The trade item identification **MUST** at a minimum be identified with a GTIN. For the purpose of traceability, this may not be sufficient, requiring additional information to uniquely identify a product or grouping of products such as a batch/ lot number or where appropriate, a serial number.

  The corresponding GS1 Standards are GTIN, GTIN + Batch/Lot Number and GTIN + Serial Number/SGTIN.

- ✓ When the traceable item is a **logistic unit**:
  It **MUST** be uniquely identified. The corresponding GS1 Standard is the SSCC.

Step 9: Apply the identification to the identification carrier on the traceable item or in an accompanying document when a transformation takes place.
The Primary Actor is the Traceable Item Creator.

The corresponding GS1 Standards when using bar codes:
- If the traceable item is a trade item crossing the point of sale (consumer unit): EAN/UPC, RSS.
- If the traceable item is a trade item not crossing the point of sale (grouping of trade items): GS1-128, ITF-14, RSS, EAN/UPC (excluding GTIN-8), if is a Batch/Lot of trade items not crossing the point of sale, or a serialized trade item not crossing the point of sale: GS1-128, RSS.
- If the traceable item is a logistic unit: GS1-128, RSS
- If the traceable item is a shipment: GS1-128
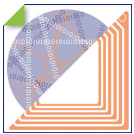
The corresponding GS1 Standards when using RFID:
- EPC Class 1 Generation 2 UHF RFID protocol for communications at 860-960 MHz
- EPC Global Tag Data Standard
- For more information http://www.epcglobalinc.org/standards

All instances of a traceable item **MUST** carry a global, unique identification directly on the traceable item or if not possible at least on the asset containing it or on an accompanying document.

The identification carrier **MUST** remain on or attached to the traceable item until the traceable item is consumed, sold for consumption or destroyed.

The identification carrier **MUST** remain on or attached to the traceable item when it is packed in an upper level of packaging

The identification carrier **MUST** carry some information to link with at least one Traceability Data Source (i.e. Brand Owner, importer).

The traceable item identification **MUST** appear in all accompanying documents or messages containing information related to the traceable item.

Step 10: Capture the identification of the traceable item or the asset containing it from the identification carrier when despatching and receiving the traceable item
The Primary Actors are the Traceable Item Source and Traceable Item Recipient. The Secondary Actors are Traceable Item Creator, Transporter, Traceability Data Source, and Traceability Data Recipient.

All Traceable Item Sources and Traceable Item Recipients **MUST** collect the identification of the traceable item or asset containing it from the identification carrier.

Step 11: **Collect all other data including traceability information from internal and external sources by any method**

The Primary Actor is the Traceability Data Recipient. The Secondary Actors are Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Traceability Data Creator, and Traceability Data Source.

Step 12: **Share relevant traceability data: send information by any method**

The Primary Actor is the Traceability Data Source. Secondary Actors are Traceable Item Creator, Traceable Item Source, Transporter, and Traceability Data Creator.

All Traceable Item Sources(s) and Traceable Item Recipient(s) MUST record and MAY share the data elements detailed in the Minimum Data Requirements for Traceability on page 16 (often recorded within shipment identification documents).

The Traceable Item Source **MAY** have to share or make available some details and quality information about the traceable item with one or more Traceability Partners.

A process or event on which there may be a need to retrieve information **MAY** be uniquely identified.

Step 13: **Store traceability data**

The Primary Actor is the Traceability Partner.

All Traceable Item Creators, Sources and Recipients **MUST** record the linkage between Traceable Items created, received, processed and/or dispatched.

Traceability data **MUST** be archived for a minimum period that is set by regulation (e.g., food law), business practice (e.g., internal policy, contract) or GS1 standards.
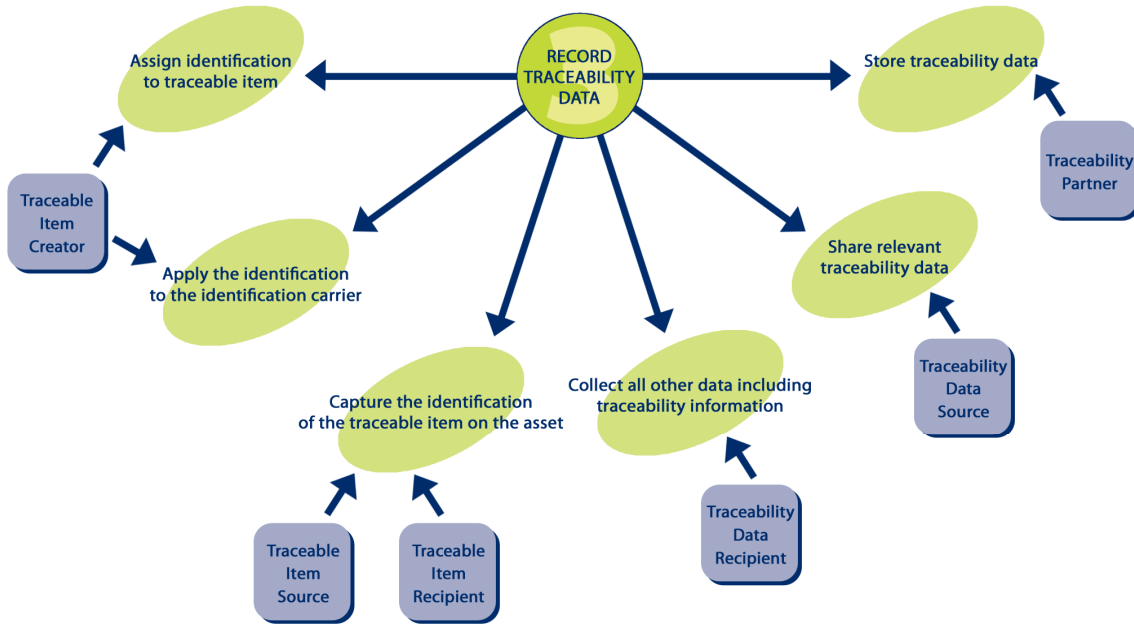
Figure 8:
Record traceability data

Sub-process 3 ("Record Traceability Data") ends at the delivery to the "Back Room" or "Back Door" (the receiving area for the final stage of the point of sale or service), the destruction of the item or the out-of-scope of the traceability process. The output of Sub-process 3 is that Traceability Partners can identify traceable items and collect and record relevant traceability data as traceable items move across the supply chain.

Sub-process 4: Request Trace

This sub-process determines how to initiate and respond to a traceability request. Any Traceability Partner may initiate a trace request. The authorities or a consumer complaint may be the reason for a Traceability Partner to start a trace request to recall or withdraw defective product. *See Figure 9.*

A trace request may trigger subsequent trace requests up or down several levels of the supply chain in order to fulfil the original request. This fulfils the requirement often included in regulations to the effect that traceability must work "**one step up and one step down**" the supply chain. The trace request may jump a step to contact a Traceability Partner further up or down the chain in order to obtain the information more quickly.

This sub-process begins when there is a need for trace. The information is not available internally, and the information must be requested to external trading partner.

Step 14: Initiate trace request.
The Primary Actor is the Trace Request Initiator. Secondary Actors are Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, and Traceability Data Recipient.

Any Traceability Partner **MAY** send a trace request to a Traceable Item Source, Traceable Item Recipients, Traceability Data Source or Traceability Data Recipient.

Traceability partners who wish to initiate a trace request **MUST** communicate to the Traceability Data Source at least one item of information from the list below to help the Traceability Data Source find the information requested:
- Traceable item identification (or some traceable item attributes)
- Traceability Partners identification (or some Traceability Partners attributes)
- Location identification (or some location attributes)
- Date/Time, period of time
- Process or event identification (or some process attributes)

Step 15: Receive the trace request.
The Primary Actor is the Traceability Partner.

Step 16: Send a response to the requested trace.
The Primary Actor is the Traceability Partner.

Step 17: **Receive a response to the requested trace.**
The Primary Actor is the Trace Request Initiator. Secondary Actors are Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, and Traceability Data Recipient.

Sub-process 4 ("Request Trace") ends when the Trace Request Initiator receives information or receives the message that the information cannot be found.

The output of this sub-process is that the traceability data is available and Traceability Partners can provide comprehensive, accurate and timely information to an authorized party upon request about a traceable item.
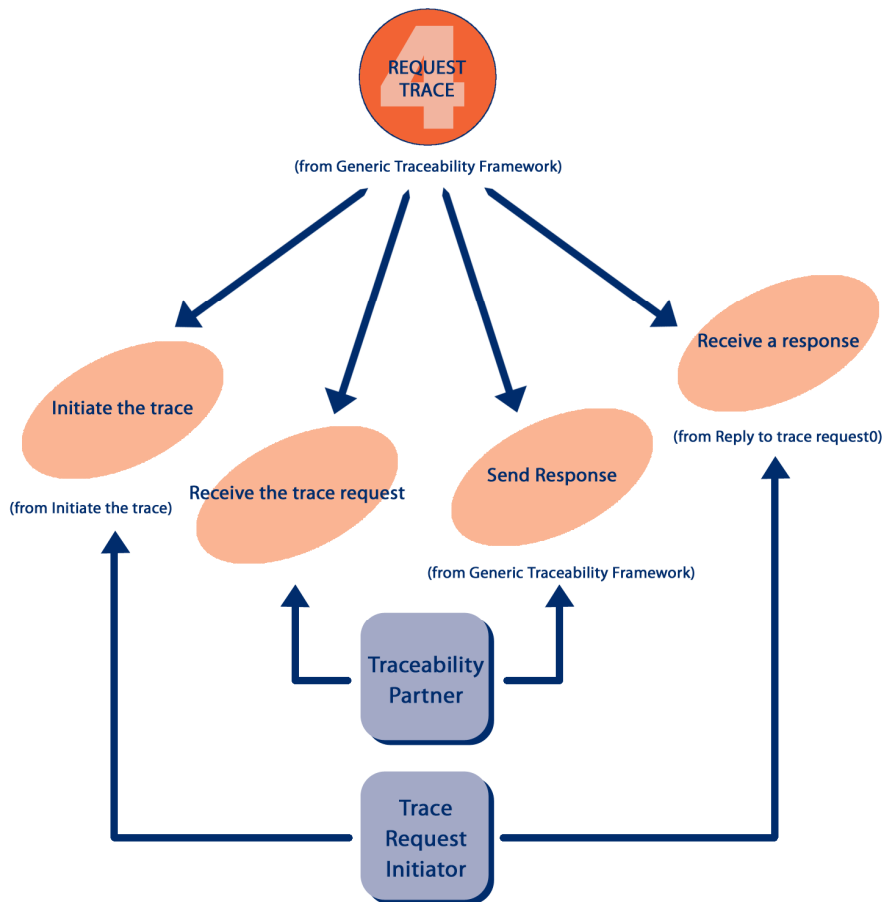
Figure 9:
Request trace

Sub-process 5: Use Information

This sub-process enables the use of the previous processes to take appropriate action as required by legal and business requirements. It begins when Trading Partners decide to use information.

Step 18: Take action.
The Primary Actor is the Traceability Partner.

This sub-process ends when action meets the legal and business requirement.

The output of this sub-process is that Traceability Partners have performed traceability and meet the legal and business requirement.

Implementing a traceability system within a supply chain requires all parties involved to systematically link the physical flow of materials and products with the flow of information about them.

Figure 10: Sub-processes, steps and primary roles in the traceability process

Steps	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Subprocesses	PLAN AND ORGANIZE		ALIGN MASTER DATA					RECORD TRACEABILITY DATA						REQUEST TRACE				USE INF
Physical Process Flow Roles																		
Traceable item creator	✔	✔	✔	✔	✔		✔	[P]	[P]	✔	✔	✔	✔	✔	✔	✔	✔	✔
Traceable item source	✔	✔	✔	[P]	✔		✔			[P]	✔	✔	✔	✔	✔	✔	✔	✔
Traceable item recipient	✔	✔	✔	[P]	✔		✔			[P]	✔		✔	✔	✔	✔	✔	✔
Transporter	✔	✔	✔	✔	✔		✔			✔	✔	✔	✔	✔	✔	✔	✔	✔
Information Process Flow Roles																		
Brand owner	✔	✔	✔	✔	✔	[P]	✔	✔					✔	✔	✔	✔	✔	✔
Traceability data creator	✔	✔	✔	✔	✔	✔		✔			✔	✔	✔	✔	✔	✔	✔	✔
Traceability data source	✔	✔	✔	✔	✔	✔				✔	✔	[P]	✔	✔	✔	✔	✔	✔
Traceability data recipient	✔	✔	✔	✔	✔		✔			✔	[P]		✔	✔	✔	✔	✔	✔
Trace request initiator														[P]			[P]	✔

Column step descriptions:
1. Determine how to assign, collect, share and keep traceability data
2. Determine how to manage links between inputs, internal processes and outputs
3. Assign Identification to the party
4. Assign Identification to physical locations
5. Assign Identification to
6. Assign Identification to the asset
7. Exchange master data
8. Assign Identification to the traceable item, when it is created
9. Apply the identification to the traceable item or in an accompanying document
10. Capture the identification to the traceable item on the traceable item or the asset containing it from the identification of the traceable item when a transformation takes place
11. despatching and receiving the traceable item
12. Collect all other data including traceability information from internal and external sources by any method
13. Share relevant traceability information by any method
14. Store traceability data
15. Initiate the trace request
16. Receive the trace request
17. Send a response / Receive a response
18. Take action

[P] = Primary role in the designated use case   ✔ = Involved in the designated use case

Traceability Management Rules

1 Traceability systems and procedures meet business, regulatory, and legal requirements for public safety by providing access to relevant party and product traceability information.

2 A traceable item must be one of the following:
- Shipment
- Logistic unit
- Trade item
- Batch/lot of trade items
- Serialized trade item

3 Traceability data includes information about:
- What is it? (i.e., the traceable item)
- Who has been involved? (i.e., the traceability partner(s))
- Where did it happen? (i.e., location)
- When did it happen? (i.e., date/time, period of time)
- What happened? (i.e., process or event)
- The following information is NOT within the scope of an external traceability system:
  - Full recipes or formulas,
  - Financial or pricing data,
  - Employees personal data, or
  - Research and development data

4 Key traceability principles are:
- Unique identification of products, logistic units, locations and assets
- Capturing and recording traceability data
- Sharing traceability data between trading partners
- Linking in-bound materials through changes to new out-bound traceable items

5 Traceability is an integral part of the business process. It is not separate from logistical processes and/or product safety and quality programs.

6 A traceable item may be related to another traceable item.

7 Instances of a traceable item may exist in multiple locations at the same time.

8 There may be several levels of traceable items at the same time in one shipment with regards to the traceable item hierarchy.

9 Traceability data may be master data, constant across time; or transactional, changing with each case or shipment.

10 All Traceability Partners must have internal and external traceability to achieve traceability across the supply chain.

11 Every Traceability Partner may decide on HOW to implement internal traceability systems. It is however essential that they be able to collect, record, and share the necessary information with upstream and downstream Traceability Partners in an accurate and timely manner.

12 Traceability Partners should use GS1 standards to ensure fast and accurate flow of information between trading partners.

13 Traceability Partners should not impose proprietary practices on other Traceability Partners.

14 It is not necessary for all Traceability Partners to store and share all traceability information, but each must be able to access relevant information and share it without infringing the intellectual property of other traceability partners.

15 The minimum information shared between Traceability Partners should be the greater of:
- minimum requirements defined in this GS1 Traceability Standard
- what is needed for day to day business transactions with trading partners

16 Each Traceability Partner must define at least one level of traceable item for each shipment.

17 The Brand Owner and/or Traceable Item Creator must know the details of the traceable item and be able to reply to a trace request.

18 A Traceable Item Source must know what has happened to the traceable item during its internal process and when, where, and to whom it has despatched the traceable item. Each Traceability Partner must store the data links between what is received, produced, packed, stored and shipped. When the Traceable Item is mixed with similar items from many locations or batches (e.g. in a grain silo) the Traceability Partner must store records of all inputs and outputs in order to provide fair estimates of where the Traceable Item has gone.

19 A Traceable Item Recipient must know the Traceable Item Source that supplied the traceable item.

20 If a traceable item is contained within another traceable item and links are maintained, Traceability Partners may store only records of the movements and location of the higher-level traceable item. "Contained in" means that there is an upper level of packaging and that the lower level item can be removed. It is different from an ingredient "composing" a finished good.

21 Traceability Partners must link physical movement of traceable items to the information movement, both between the Traceable Item Source and themselves, and between Traceable Item Recipient and themselves. This transactional flow of information must exactly reflect the physical movement. This linkage is necessary for the traceable item to be traced from point of origin to the POS or point of service. Conversely, this linkage must also ensure that product can be traced back through the supply chain.

22 The Traceable Item Recipient may collect information from both the previous Traceable Item Source and the previous Transporter source.

23 The Traceable Item Source may communicate information to both the Traceable Item Recipient and the subsequent Transporter.

24 A Trace Request initiator must contact its Traceability Partners, including the Brand Owner.

25 The Traceability Data Source must reply as quickly as possible to the party requesting traceability information. The time period allowed may be defined in local regulations or commercial agreements.

26 A Trace Request may trigger subsequent trace requests up or down the supply chain in order to fulfil the original request.

27 A traceability system is only as good as its weakest link. If failure occurs at any point, traceability breaks down.

28 Various industries, regions, countries or roles may have additional business requirements beyond this generic GS1 Traceability Standard. These should be addressed by defining specific extensions.
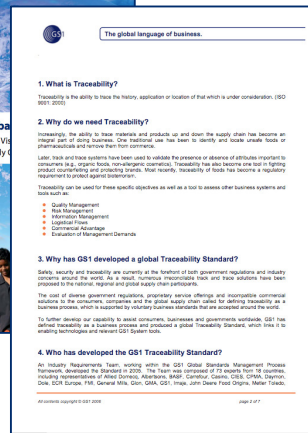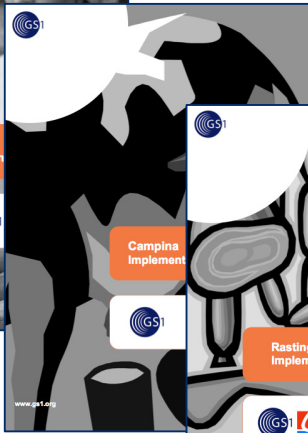
Further Resources

More information on the GS1 Traceability Standard can be found on the GS1 web site at www.gs1.org/traceability. There you will find the GS1 Global Traceability Standard brochure; traceability FAQs (frequently asked questions), implementation guidelines for fish, meat, fresh produce, bananas and wine; and a number of case studies.

Check back often for updates and new material.

You may also contact the Traceability Solutions Manager at traceability@gs1.org, or your local GS1 Member Organisation (www.gs1.org/contact).

www.gs1.org/traceability

Glossary

Term	Description
Actor	An actor is a role that a user plays with respect to a system.
Application Identifier (AI)	The field of two or more characters at the beginning of an Element String that uniquely defines its format and meaning.
Batch/Lot Number	A batch unites products/ items that have undergone the same transformation processes. Batch and Lot are considered as synonyms.
Consumer Unit	The trade item intended to be sold to the end consumer.
Event	Is an occurrence of a process in a specific time or a period of time.
External Traceability	External traceability takes place when instances of a traceable item are physically handed over from one trading partner (traceable item source) to another (traceable item recipient).
GLN (Global Location Number)	The GS1 Identification Key comprising a GS1 Company Prefix, Location Reference, and Check Digit used to identify physical locations or legal entities.
Global Trade Item Number (GTIN)	The format in which Global Trade Item Numbers® (GTINs®) must be represented in a 14-digit reference field (key) in computer files to ensure uniqueness of the identification numbers.
GRAI	Global Returnable Asset Identifier.
GS1 System	The specifications, standards, and guidelines administered by GS1.
Identification	The identity assigned to an item or party that is needed to access other relevant information about the item or party.
Identification Carrier	Mark /tag/label/accompanying document sometimes called "passport" or "identity card" in some industry sectors
Internal Process	A series of actions, changes or function(s) within a company or organization that brings about a result.
Internal Traceability	Internal traceability takes place when a trading partner receives one or several instances of traceable items as inputs that are subjected to internal processes, before one or several instances of traceable items are output.
Link	Recording the information necessary to establish the relationship to other relevant information.
Location	A place where a traceable item is or could be located. [ISO/CD 22519] A place of production, handling, storage and/or sale.
Logistic Unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain.
Master Data	Master Data describes each item and party involved in supply chain processes. Master Data is defined as data having the following characteristics: • Permanent or lasting nature • Relatively static, not being subject to frequent change • Accessed / used by multiple business processes and system applications Can either be neutral or relationship dependent.
Party	A party (or) Location is any legal, functional or physical entity involved at any point in any supply chain and upon which there is a need to retrieve pre-defined information. A party is uniquely identified by a GS1 Global Location Number.
Process	A series of actions or steps towards achieving a particular end. Examples of common processes include Production, Transformation, Quality Control, Storage, Transportation, Movement, Recycle, Return, Packing, Receiving, traceability…

Term	Description
Record	Act of creating a permanent piece of information constituting an account of something that has occurred.
Serial Shipping Container Code (SSCC)	The 18-digit GS1 System Identification Key comprising an Extension digit, GS1 Company Prefix, Serial Reference, and Check Digit used to identify a logistic unit.
Serialized Global Trade Identification Number (SGTIN)	SGTIN is a method of identifying unique items at the unit or retail level as well as at the case and carton levels. It is composed of a GS1 assigned Company Prefix & Item Reference (GTIN), combined with a Serial Number. Where UCC/EAN bar codes have traditionally been used, the SGTIN specification combined with an RFID tag can give visibility beyond the Item Reference right down to the exact serial number of the item.
Share	Act of exchanging information about an entity or traceable item with another Trading Partner.
Shipment	An item or group of items delivered to one party's location at one moment in time that have undergone the same despatch and receipt processes
Traceability	[ISO 9001: 2000] Traceability is the ability to trace the history, application or location of that which is under consideration.
Traceability Data	Any information about the history, application or location of a traceable item. This may be either master data or transactional data.
Traceable Item	A physical object where there may be a need to retrieve information about its history, application, or location. The level at which the traceable item is defined within a product packaging or logistical hierarchy is dependent on the industry and degree of control required. Could be tracked, traced, recalled or withdrawn. Could exist in multiple locations at the same time (for example, if identified at the Trade item and Batch level). A traceable item may be related to another traceable item. See also definition for process
Trace Request	A formal inquiry about the history, application or location of a traceable item. A request can trigger subsequent trace requests up or down the supply chain in order to fulfil the original request. The requesting party requires a response from the data source.
Tracing (Tracing Back)	The ability to identify the origin, attributes, or history of a particular traceable item located within the supply chain by reference to records held. "Tracing back" and "tracking forward" are the preferred terms used in this document.
Tracking (Tracking Forward)	The ability to follow the path of a traceable item through the supply chain as it moves between parties.
Trade Item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.
Trading Partner	Any Supply Chain Partner that has a direct impact on the flow of goods through the supply chain. Examples include Third Party Logistics Provider, Manufacturer, Retailer, and Grower.
Transformation	A change to the nature of a traceable item that changes the identity and/or the characteristics of the traceable item. The act of changing the item such as combining ingredients to make a finished product or case picking to create a new pallet. Transformation can be production, aggregation, grouping, splitting, mixing, packing and repacking traceable items.
Transporter	The party that handles and or stores the traceable item from one point to another without transforming the item. Receives, carries, and delivers one or more traceable items. The Transporter may only have 'possession, custody, control' of a traceable item, as distinct from ownership.

GS1 Global Office
Avenue Louise 326, boite 10
1050 Brussels Belgium
T +32 2 788 7800
F +32 2 788 7899
W www.gs1.org/traceability
E traceability@gs1.org