



GS1 Standards Document

Business Process and System Requirements
for Full Supply Chain Traceability

GS1 Global Traceability Standard

Issue 1.3.0, November 2012



Document Summary

Document Item	Current Value
Document Title	GS1 Standards Document GS1 Global Traceability Standard
Date Last Modified	November 2012
Current Document Issue	Issue 1.3.0
Status	Ratified
Related CR	05-000309 08-000130 09-000143 11-000281
Document Description	This document is the GS1 Global Traceability Standard. It describes the traceability process independent from the choice of enabling technologies. It also defines minimum requirements for all organisations, industry sectors, countries, and corresponding GS1 Standards to be used in combination with information management tools.

Log of Changes in Issue 1.3.0

Issue No.	Date of Change	Changed By	Summary of Change
1.0	Sep-2007	John Ryu Diane Taillard	Initial Version
1.1	Jan-2009	Janice Kite	Changes to reflect application to Healthcare sector. Posted for eBallot.
1.1.0	Feb-2009	John Ryu	Errata Update based on eBallot Approval and Comment Reference Summary of Changes
1.1.0	Feb-2009	Mike Mowad	Convert document to final issue, no content changes.
1.2.0	Oct 2009	John Ryu	Process Change Request 9-143
1.2.1	Jan 2010	John Ryu	Incorporate Public Review Comments
1.2.2	Mar-2010	John Ryu	eBallot Approved
1.3.0	July 2012	John Ryu	Process Change Request 11-281
1.3.0	November 2012	John Ryu	eBallot approved WR 11-281 and update for publication

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1. Overview

1.1. Business Opportunity and Business Needs

Businesses, end users and authorities in various markets around the world have an interest in establishing systems to track and trace products at various points of the supply chain. And, although this shared interest is currently high profile in the food, beverage and healthcare sectors, the key principles can be applied to any industry sector served by GS1 that has a need to track and trace product across the full supply chain.

This document defines what the traceability process standard encompasses and it shows the corresponding GS1 numbering, automatic identification data capture (AIDC) or data communication standards that must be in place for best practice applications. .

Partners in a supply chain could use various levels of product traceability to enable business needs such as:

- To comply with regulatory requirements and guidance on recalls
- To reduce business risks above and beyond legal compliance
- Product recall and withdrawal (notably to achieve a greater degree of precision, to demonstrate control, increase efficiency and reduce the cost of product recall or withdrawal)
- To comply with a trading partner's specifications
- Efficient logistics management
- Effective quality management
- To support product and/or patient safety
- To provide information to end users and trading partners
- To verify the presence or absence of product attributes (e.g., organic, dolphin safe, contains latex)
- Brand protection
- Product authentication
- Anti-counterfeit policies
- Visibility in supply and demand chain

1.2. Business Intention

The goal of this document is to communicate the GS1 Global Traceability Standard. This is a PROCESS standard describing the traceability process independent from the choice of enabling technologies (see sections 6, 7.3 and 8). It defines minimum requirements for all stakeholders, organisations, industry sectors and countries and corresponding GS1 Standards to be used in combination with information management tools (see section 7.1).

This is a building block for developing:

- Traceability systems
- Traceability assessments and auditing tools
- Industry or country specific traceability Implementation Guidelines

- Extensions of traceability requirements for specific industries, countries or business needs
- New GS1 standards that may be required (or leverage of existing standards)



Note: Refer to section 11.

The intention is therefore to create a generic framework that is expected to be used by any business, any industry sector, any organisation, large or small, and by any country in order to develop specific implementation guidelines or additional requirements. These implementation guidelines will take into consideration, for example, scope and traceable item hierarchy specific to the business needs (see sections 4, 7, 9, 11).

This GS1 Global Traceability Standard will maximise usage of the well-established, globally acceptable and voluntary GS1 supply chain standards that uniquely identify a “traceable item”, describe the establishment of appropriate and effective records of events, and provides for accurate communication about the traceable item between trading partners.

This meets the core need to be able to track forward and trace back (one step up, one step down as a minimum) at any point along the full supply chain no matter how many trading or traceability partners and business process steps are involved.

This may be used for benchmarking or certification of traceability systems.

1.3. Business Justification

Organisations require consistent traceability solutions spanning the full supply chain regardless of country or industry sector.

By defining a shared minimum requirement and showing what action is required from organisations, industry sectors, countries, or a group of trading or traceability partners, the GS1 Global Traceability Standard will enable interoperability between traceability systems across the whole supply chain whilst accommodating specific business, industry sector, or regulatory requirements.

Each partner in the supply chain will have their own objectives in terms of the use of the traceability system, the lowest level of traceable item and the data required to manage their particular business environment and strategy. Yet partners need to work collaboratively in order to achieve the required level of traceability across the whole supply chain. Furthermore, having a standards-based traceability process can demonstrate that an organisation has met requirements of corporate responsibility.

The GS1 Global Traceability Standard will serve as a foundational standard for all industry sectors and countries to use as a starting point for identifying their specific business requirements. This framework will ensure a common approach and understanding of key principles by users around the world.

1.4. Audience

The audience is all GS1 member organisations, the service provider community that serves them, business associations and government organisations. This includes all parts of the supply chain, for example: raw material (sometimes called “primary”) producers, processors, manufacturers, retailers, wholesalers, healthcare providers, importers/brokers and exporters, third party logistic providers, foodservices, logistic providers, transporters or carriers and solution providers.

The audience includes all senior managers with executive responsibility, managers and employees working in production, quality and safety, logistics, information technology, product development, marketing, customer management roles, patient management roles and end users/patients

2. Acknowledgements

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3. References

Reference Name	Description
[Ref 1] GS1 General Specifications	GS1, Version 10
[Ref 2] ECR – Using Traceability in the Supply Chain to meet Consumer Safety Expectations	ECR Europe, March 2004
[Ref 3] EPCIS	Electronic Product Code (EPC) Information System (IS)
[Ref 4] GS1 Business Message Standards	GS1

 **Note:** This section provides the primary document sourced for information and references. This is not an exhaustive list, and the specific references can be found in the implementation guides.

4. Scope


4.1. Overall Business Context

Context Category	Value(s)
Industry	All industries served by GS1
Geopolitical	All
Product	All (raw material, packaging material, and finished goods)
Process	Traceability
System Capabilities	GS1 System
Official Constraints	None

4.2. In Scope

The GS1 Global Traceability Standard includes:

- Identification of parties, items and events
- Labelling and/or marking and/or tagging of products
- The nature and type of data to be captured and collected
- Record keeping including archiving / data storage
- Communication and sharing of information (Information can be shown at the physical level of packaging labels and printed bar-codes or captured and recorded at a data management level and communicated using e-business messaging including, e.g. EDI.)
- Links identification and management
- Retrieval / search of information (The ability to track and trace a traceable item from creation to the point of sale, use or destruction depending on the industry, e.g. using a standards based EPCIS)

 **Note:** Sector specific examples of traceability systems and information flow are available in the GTS Sector Specific Implementation Guidelines.

All types of products are in scope, for example:

- Units (e.g., an individual product, batches / lots)
- Trade items (e.g., a carton containing consumer units)
- Logistic units (e.g., a pallet)
- Packed and bulk products
- Branded Goods, private labels, generic unbranded products


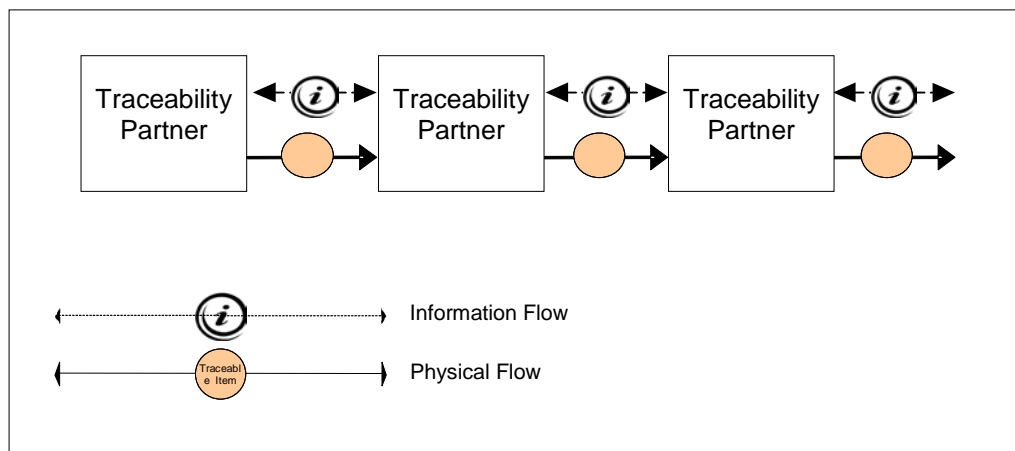
 **Note:** By-products, recycled products, surplus stock, returns and recalls follow the same traceability process.

Figure 4-1 Product Flow in Supply Chain



Traceability can involve trading and non-trading partners (traceability partners), a physical flow of traceable items and information flows of traceability data. Traceability partners can be any actor in the supply chain. The physical flow can include, depending on the industry, any product from initial inputs

up to sale or use by the final end user. Traceability during the physical flow can also include the use of a traceable item and the destruction of any traceable item.

For example, the following products may be within the scope of a traceability system:

- Any input to animal or plant agriculture, e.g., feed, pesticide
- Any individual product destined for human consumption, e.g., an egg, a pharmaceutical tablet
- Any ingredient used in a multi-ingredient food, e.g., the flour, eggs, spices, additives, etc., in a cake
- Any item of packaging used in contact with a product. Examples of packaging include a glass bottle, a sealed foil pack, a sealed blister pack, a tin, plastic film or a carton
- Any finished manufactured product, e.g., a batch / lot of cakes, shampoo
- Any trade item and logistic unit, e.g., a tank of milk

4.2.1. Immediate Phase

The outputs of the immediate phase are:

- To define the traceability process
- To define minimum traceability requirements for all traceability partners
- To identify existing GS1 standards and new requirements to be leveraged or developed as a priority

The principles of traceability can apply to any industry sector served by GS1 even in meeting regulatory requirements and establishing the basis for efficient product recalls and withdrawals as a priority.

4.2.2. Subsequent Phases

The following topics may be addressed in subsequent phases:

- Development of new GS1 Standards required for traceability
- Industry or application specific extensions
- Use of traceability information (e.g., notification of a product withdrawal or recall)
- Exceptions
- Traceability up to the final end user
- Waste
- Samples (e.g. laboratory samples or promotional items)
- Returnable assets (e.g., roll cages, tanker trucks, reusable pallets, hospital gas cylinders...)

4.3. Out of Scope

The process of collaborative product development and defining product specifications is not part of the traceability process. However, data deriving from this process may need to be taken into account as part of the traceability data for a product recall.

Industry or application specific Implementation Guidelines will need to be developed to facilitate the implementation of the GS1 Global Traceability Standard. The implementation process required to incorporate all participants in a supply chain traceability process standard is out of scope of the standard in itself including, e.g., training and implementation support.

5. General Definition

5.1. Initial Challenges

Organisations have different objectives and ways of implementing traceability. These differences are intrinsic to their various roles in the supply chain (e.g., manufacturer, distributor, transporter), from the diversity of products and industry sectors, to their regulatory and business environment, and to their different strategies in terms of costs and benefits.

In many countries, some actors have limited understanding of traceability requirements and no capital to invest in traceability tools, yet products are supplied to sophisticated markets where traceability is required. This can be addressed using generic requirements for traceability using simple business processes.

Legislation generally does not specify the traceability system to be used. Most products cross geographic borders at least once in their life cycle, subjecting them to multiple, sometimes inconsistent regulations. Supply chains have different business requirements and different expectations in terms of enabling technologies. Some do not recommend any specific automatic data capture, some recommend best practices with bar-codes and EDI, some are beginning to use RFID, and others are implementing a traceability network to be able to electronically retrieve information about products from each point along the chain, e.g. using EPCIS (Electronic Product Code (EPC) Information System (IS)).

The challenge for this Process Standard is to agree on generic requirements and on a common way to describe the traceability process irrespective of these differences.

The GS1 Global Traceability Standard remains a high level description of the process enabling and promoting supply chain collaboration but allowing each organisation to design its traceability system in terms of breadth, depth and precision to support its own business objective(s). This process standard is applicable to all types and sizes of organisations in any part of the supply chain.

5.2. Assumptions

The GS1 Global Traceability Standard is based on the use of global, voluntary GS1 business standards. The following definition is considered as the reference definition of traceability in this document:

Traceability is the ability to track forward the movement through specified stage(s) of the extended supply chain and trace backward the history, application or location of that which is under consideration

The ISO 9001:2000 definition of Traceability has been used as basis and leveraged in order to suit the context of the supply chain.

For practical reasons, “trace” or “track and trace” may be used as equivalent terms to designate the action of ensuring the traceability

For specific industry sectors, there may be other definitions. For clarity and to assist shared understanding and wider implementation of this GS1 Global Traceability Standard, a Glossary of Business Terms has been identified (section 14). It is recommended that the reader studies this glossary before reading sections 6 to 12 of this document.

5.3. Dependencies

The following GS1 standards enable implementation of the GS1 Global Traceability Standard:

- GS1 XML and EANCOM e-business messages (Align and Deliver)

- GS1 General Specifications (e.g. GS1 Data Carriers, GS1 Identification Standard,)
- EPC
- Global Data Dictionary (GDD)

GS1 user groups have already established a number of Implementation Guidelines proposing the use of GS1 Standards as part of the traceability process

6. Business Process Analysis

This analysis breaks down the traceability process. The resultant sub-processes and concepts are defined using terminology that must be understood before reading through this section; the reader should also refer to the Glossary in Section 14.

Included here in this section is:

- an explanation of internal and external traceability
- the concept of roles such as Traceable Item Creator and Traceability Data Source
- a Traceable Item Matrix to facilitate the understanding that the traceable item can exist at different levels
- a breakdown of the different responsibilities that can result due to the traceable item involving both a data flow and a physical flow which may involve different parties (Traceable Item Source and Traceable Item Recipient, Traceability Data Source and Traceability Data Recipient).

The specific Business Requirements (BR) and Business Rules (BRU) in parenthesis (e.g., BRU 14) are detailed in Section [7](#).

6.1. Business Scenario for Traceability

6.1.1. Business Process Participants Descriptions

The GS1 System distinguishes between parties and roles.

- A party is a generalisation of a legal or physical entity, for example a retailer or a manufacturer.
- A role is a specific function of a party in a specific process at a specific time for example, a buyer.

A party can have more than one role. For example, the Manufacturer can act as a seller of items and also as a buyer of raw materials.

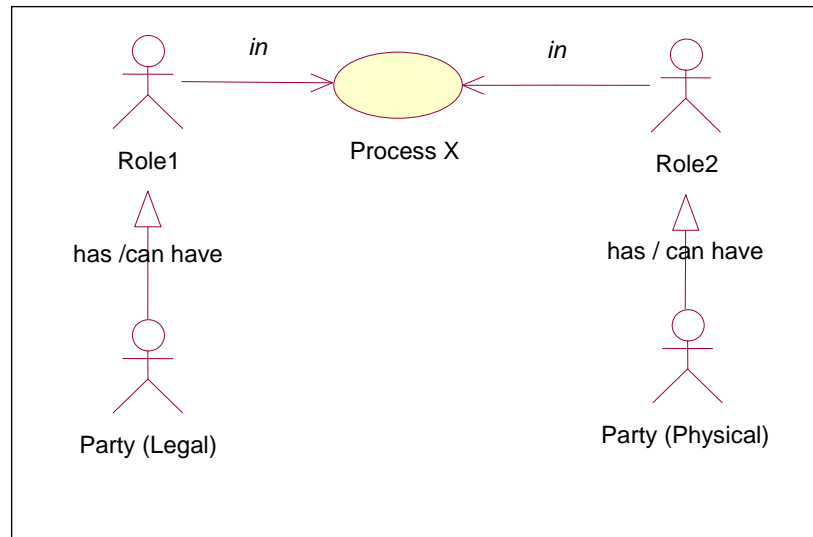
Figure 6-1 Party Relationship


Figure 6-1 shows two parties, each of them plays a different role in the process.

List of Parties:

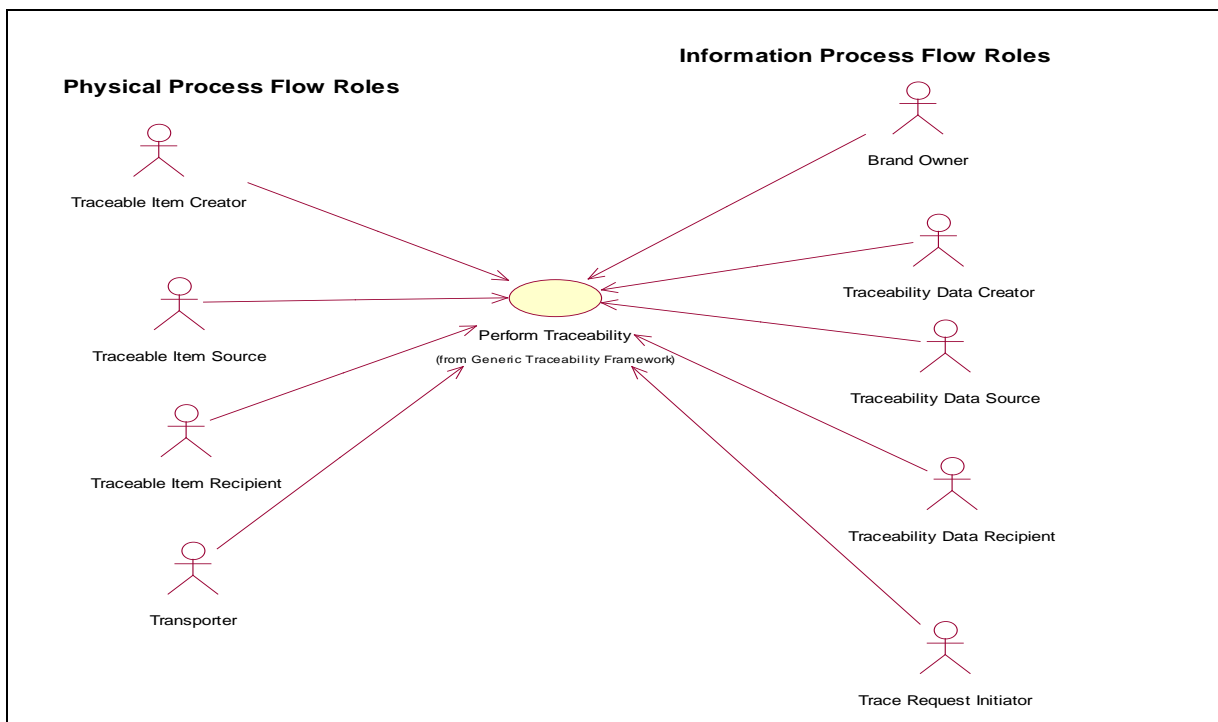
Party	Description
Carrier / Third Party Logistics Provider (3PL)	The party responsible for the shipping or delivery of the traceable item.
Processor / Manufacturer / Primary Producer / Compounder	Typically receives inputs and transforms those inputs. Examples include the farmer, an abattoir or a packer that consolidates product from 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/compounder (Pharmaceuticals).
Retailer / Point of Sale or Service Operator / Provider	Has the final relationship with the end user. 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.

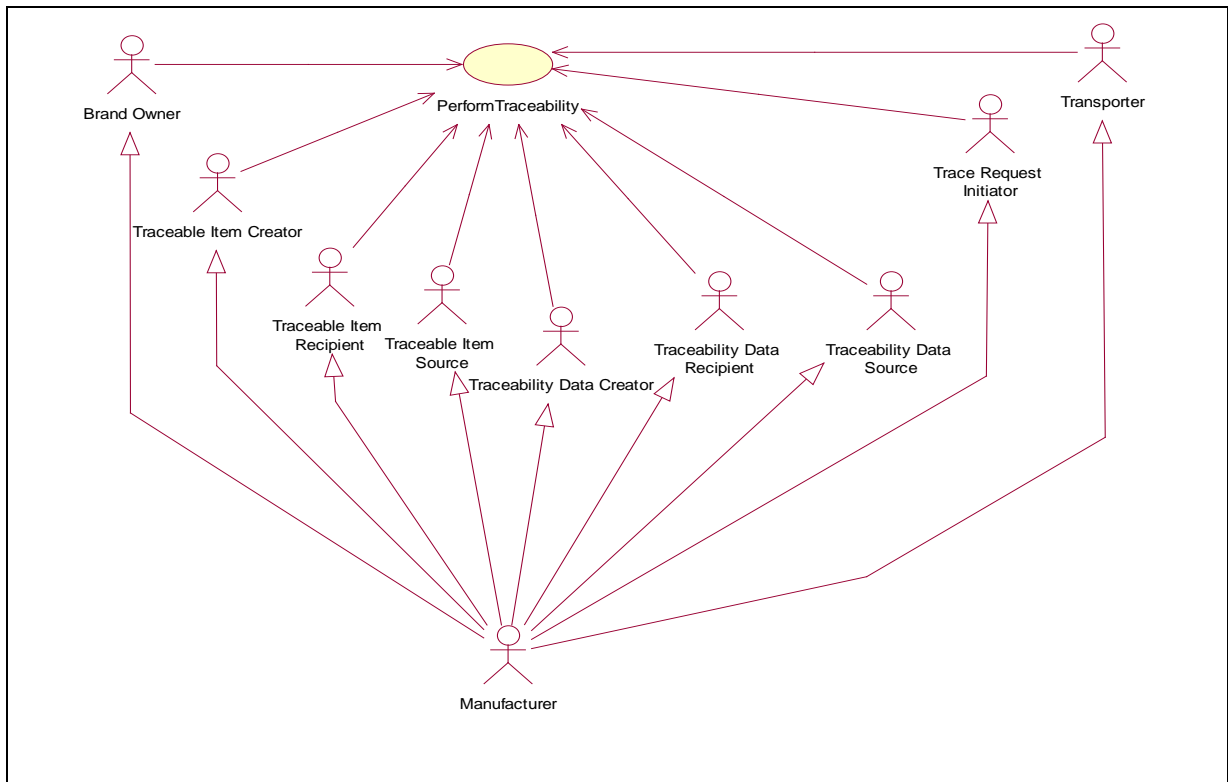
List of Roles:

Role	Description
Brand Owner	The party that is responsible for allocating GS1 System numbering and bar code symbols or EPC tag 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 the party responsible for placing a trade item into commerce.
Traceability Data Creator	The Traceability Partner that generates traceability data.

Role	Description
Traceability Data Recipient	The Traceability Partner authorized to view, use, and download traceability data.
Traceability Data Source	The Traceability Partner that provides the traceability data.
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 Recipient	The Traceability Partner that receives the traceable item.
Traceable Item Source	The Traceability Partner that dispatches or provides a traceable item.
Trace Request Initiator	The person who starts the trace request.
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 and may have ownership.

Figure 6-2 Role


[Figure 6-2](#) illustrates that parties with different roles all have a responsibility to perform traceability.

Figure 6-3 Example Manufacturer Party Relationship


Parties in the Supply Chain often play multiple roles in the traceability process; [Figure 6-3](#) illustrates the Manufacturer playing multiple roles.

Supply chains are complex, there is not one simple schema describing who is involved in the Supply Chain from upstream to downstream for all industry sectors. Yet there are typical roles in all supply chains. Reference is made in this document to the five primary parties, though there may also be intermediary parties such as secondary processors.

By the time a traceable item is purchased, consumed or used, it may have gone through a number of events and transformations. Each event or transformation may have involved a number of different parties. Every party has a responsibility to manage traceability and can use the generic traceability framework to achieve this goal.

While maintaining traceability is generally the responsibility of the Traceable Item Source and Traceable Item Recipient (party with “possession, custody, or control” of the traceable item), in some instances other parties may also have responsibility. For example, an importer may never take ownership or possession of a shipment but may have a responsibility to regulatory authorities as the “person responsible” for the traceable item. Some parties that act as an agent for another party, and never take physical possession of the traceable item (such as an importer) may also be viewed by their Traceability Partners as having responsibility for traceability.

With regard to parties, we have on the one hand all Traceability Partners involved in the physical flow and / or information flow (e.g. processor, carrier, retailers), and on the other hand other parties that are not directly involved in the supply chain process (such as certification bodies, authorities). The function or internal process often determines the level of responsibility.

In the case of product recall, two levels of responsibility can be distinguished:

- **Primary responsibility:** Typically importers, producers, processors, manufacturers, or distributors, retailers and providers who are responsible for the specification and content of

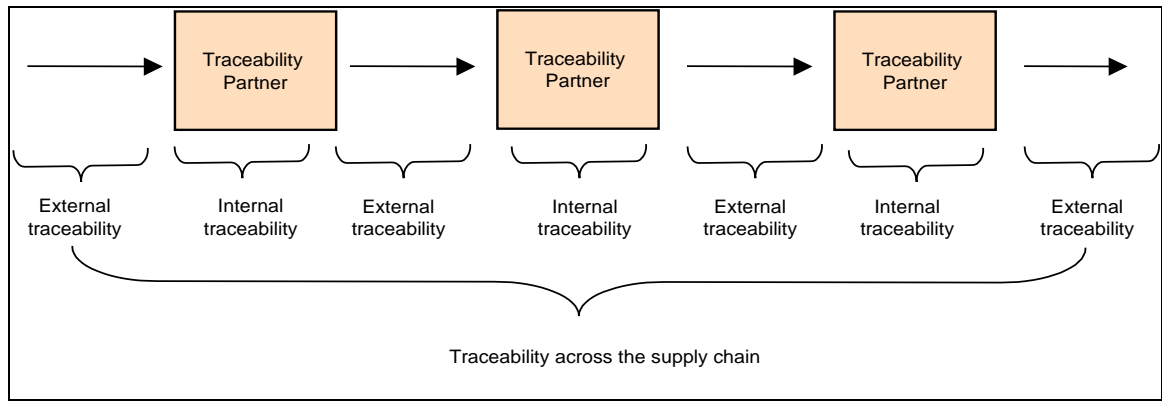
products, withdrawal and / or recall and notification. They are each responsible within the limits of the activities under their control.

- Secondary responsibility:** Typically transporters, carriers, ship owners, storage companies, and logistics providers who work on behalf of the organisations with primary responsibility. However, those with secondary responsibility must create, capture, record and share data about their traceability activities.

6.1.2. Business Scenario Overview

Traceability management involves the association of a flow of information with the physical flow of traceable items. 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 6-4 Traceability across supply chain

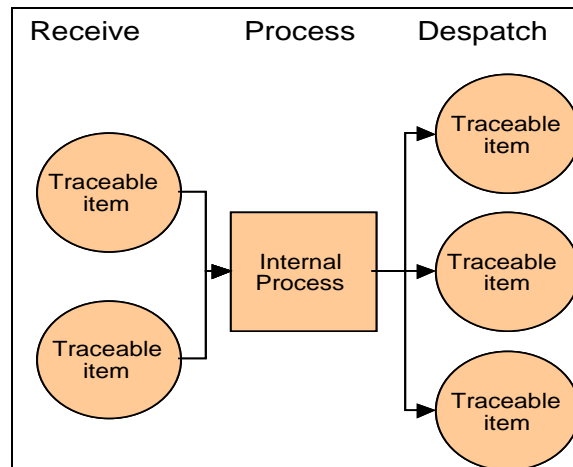


In order to achieve traceability across the supply chain, all Traceability Partners must achieve internal and external traceability (BRU 10).

6.1.2.1. 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. The following are the relevant events in respect of collecting traceability data.

Figure 6-5 Internal Traceability



Every traceability partner involved in the physical flow of products receives, processes, and despatches instances of traceable items.

The following list shows the events when traceability data should be collected:

- **Receiving** is the result of a traceable item crossing the boundary from external to internal, transferring from one party to another party.
 - The traceable item received could be, for example, raw materials, packaging or finished products.
- **Internal process** is one or more sub-processes performed by the same party or without a significant involvement of other traceability partners. Each sub-process involves traceable item inputs and results in traceable item outputs. At a minimum, the internal process must consist of one of the five following sub-processes:
 - Movement
 - Transformation
 - Storage
 - Usage
 - Destruction

Movement is the physical relocation of a traceable item.

Transformation is the act of changing a traceable item, its identity and/or characteristics, e.g. as combining ingredients to make a finished product or the combination of different finished products to create a mixed pallet or reprocessing a non-sterile instrument to a sterile item. Transformation can be manufacture, production, grouping, splitting, mixing, aggregation, packing or re-packing traceable items. The act of transforming a traceable item requires specific responsibilities for the Traceable Item Creator, e.g. applying the identification to the newly created physical traceable item(s) and recording the relevant data to support the information requirements.

Storage is the act of holding a traceable item at a location within the Traceability Partner's organisation.

Usage is the act of using the traceable item and recording the traceable usage data, e.g. that a particular instrument was used on a particular patient in a hospital.

Destruction is the act of destroying a traceable item. For example, items returned to an organisation may be incinerated.

Depending on the internal process, the relationship between traceable Items received (inputs) and traceable items shipped (outputs) can be:

- Many to One (e.g. when raw materials and packaging are combined into a finished good)
- One to Many (e.g. when a batch of product stored in bulk is packed into cases)
- Many to Many (e.g. when items are repacked into new promotion formats)
- One to One (e.g. when a raw material is transformed from fresh to frozen)
- Many to None (e.g. when finished goods are destroyed)
- One to None (e.g. when a material is destroyed)
- None to One (e.g. when a batch of water is produced)
- None to Many (e.g. when batches of fish are caught)

Despatching is the transfer from one actor to another actor in the supply chain.

An organisation that is not physically handling any products but that has a legal or contractual responsibility towards the products (e.g. Brand Owner or broker) may still be involved in traceability requirements for the information flow. As an example, the Brand Owner must be able to reply to a trace request concerning the traceable item details.

A **change of status** (e.g. quarantine or change of ownership) is also a possible event.

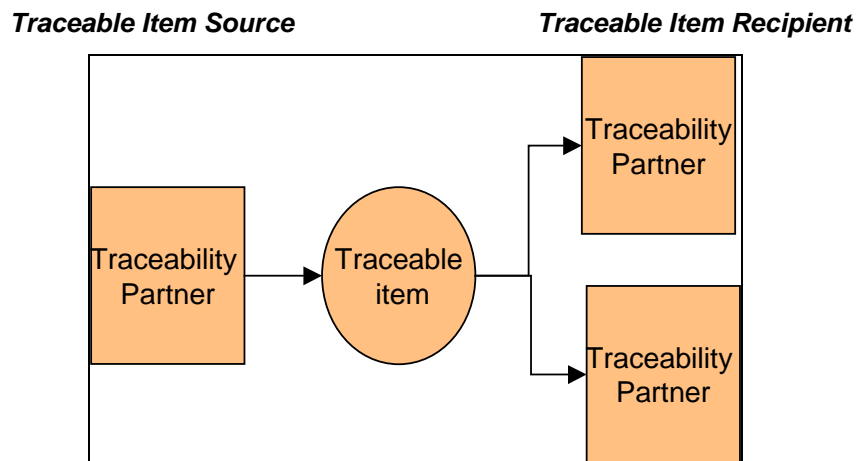
Every Traceability Partner has a responsibility to maintain agreed data that links input into a transformation process with the output, and that links the original and final location after movement (BRU 2, BR 14). For example, this link data could be held as quality records.

It's understood that each organisation may have its own internal process(es) to track product throughout its internal movement and / or transformation. Traceability records of movement and storage may help identify the impact of quality failure such as incorrect storage temperature or damage during transit. For those organisations that currently do not have any processes in place, or are looking to standardise their internal processes, this document recommends the use of GS1 global standards to capture the data that links inputs during a products internal life cycle.

6.1.2.2. External Traceability

External traceability takes place when instances of a traceable item are physically handed over from one Traceability Partner (Traceable Item Source) to another (Traceable Item Recipient).

Figure 6-6 External Traceability



Each Traceability Partner should be able to trace back to the direct source and be able to track forward to the direct recipient of the traceable item (one step up, one step down principle (1.2)).

A shipment may contain several levels of traceable items (e.g., logistic units each containing part of a batch / lot of units) (BRU 2, BRU 6, BRU 8). This allows the organisation, for example, to track forward and trace back at both the logistic unit level and the production batch / lot level (e.g., a batch of units split in several logistic units for different customers).

Traceability does not imply each traceability partner must hold and publish all traceability information, but the Traceable Item Source and Traceable Item Recipient must communicate and record identification of at least one common level of traceable item within their respective systems (e.g. logistic unit) (BRU 16, BRU 21). This ensures efficient information flow of data when tracking forward or tracing back.

All traceable items must carry identification allocated to it and be labelled / marked / tagged at source (creation) (BR 6). This document recommends the use of a GTIN or SSCC.

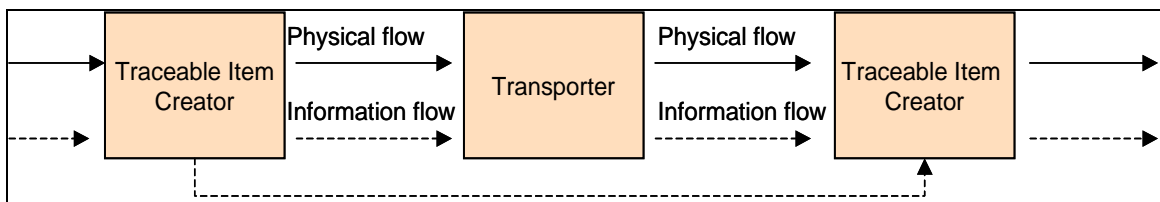
The Brand Owner must ensure the true uniqueness of the identification of the traceable item (BR 7). Where sub-contractors or licensees are involved, the way to proceed to ensure the uniqueness of identification is up to the Brand Owner and depends on contractual agreements.

The identification carrier (mark / tag / label / accompanying document sometimes called “passport” or “identity card” in some industry sectors) MUST remain on or attached to the traceable item until the end of life of the traceable item (BR 8).

6.1.2.3. Information Flow Links

In parallel to the physical flow, the Traceable Item Source must share information with the Traceable Item Recipient and the Traceable Item Recipient must collect this information (BRU 15, BRU 21, BRU 22, BRU 23). Traceability requirements in terms of information flow may be different for transporters and Traceable Item Creators.

Figure 6-7 Traceable Item Creator and Transporter Information Flow



The “One up, one down” principle between traceability partners may mean several parallel flows of data: e.g. from supplier to customer, from supplier via a Third Party Logistics Provider, from a Third Party Logistics Provider on behalf of the supplier (who would not itself have all the data about transportation / storage but would set “service level agreements / contracts” to fulfil responsibility via a third party...)

In most trading relationships, the Buyer and the Seller are the Traceability Data Recipient and Traceability Data Source, even if they are not handling the traceable items.

There is a minimum amount of data that must be recorded internally by Traceability Partners. They must maintain the minimum data elements to ensure visibility and linkage to all applicable levels. Some of these data elements must be exchanged between Traceability Partners (BR 13).

Depending on the organisation’s internal objective, the industry or the specific application of the traceability process, additional information may also need to be captured, recorded and shared. This document acts as the foundation for the business application in which additional information can be included.

6.1.2.4. Traceability Data

Traceability data includes information about (BRU 3):

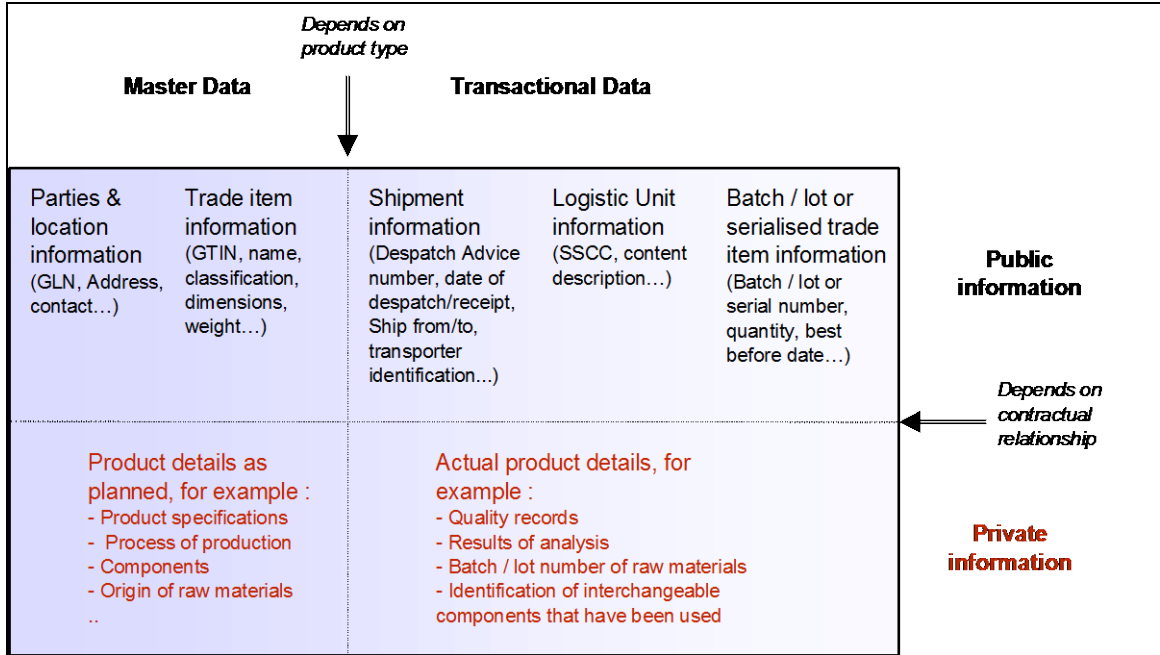
- Who? Party [Identification + data elements]
- Where? Location [Identification + data elements]
- When? Date / Time
- What? Traceable item [Identification + data elements]
- What happened? Process or event [Identification + data elements]

Traceability data can be planned, expected or actual. With respect to traceability, it is usually the actual date that is relevant.

Traceability data can be master or event data (BRU 09). In the traceability context, master data is relatively consistent over time and independent from day to day physical events (e.g., name of the

trade item, dimensions, country of origin of the raw material if part of the product specifications...). Event data is created during the physical flow of goods. It can only be collected when events occur (e.g., date of receipt, weight if variable...). The recommendation is to align master data, which is public (shared between traceability partners), before the physical flow begins (see section [6.1.3](#)).

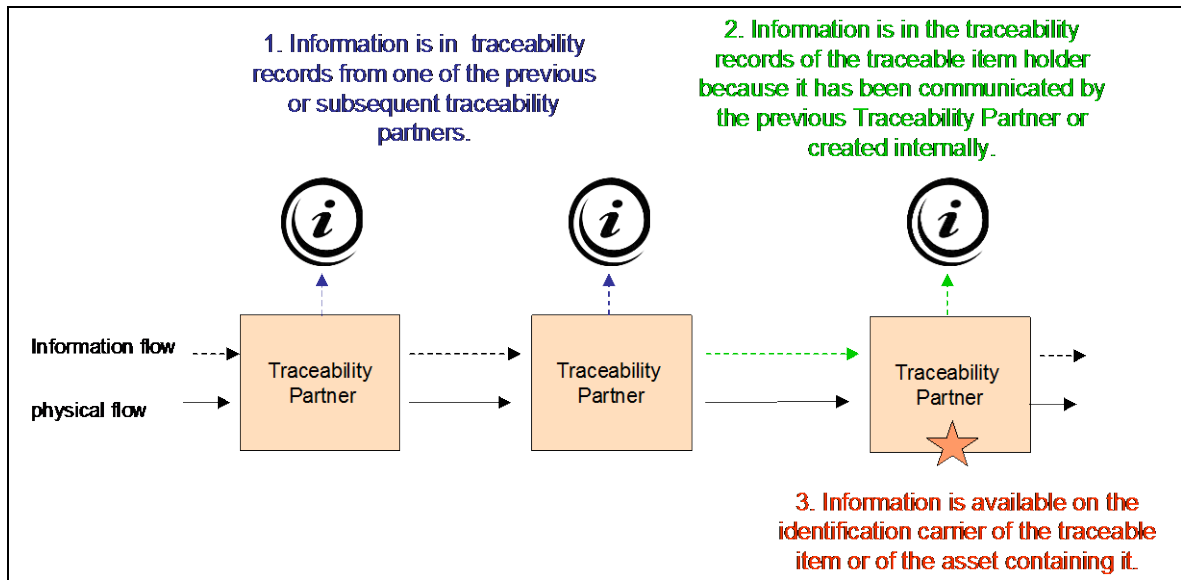
Figure 6-8 Traceability Data Matrix with Examples



Traceability does not imply Traceability Partners must hold and share **all** traceability information, but they must all have the ability to internally search and access relevant information, and share the agreed information required without infringing the intellectual property of each Traceability Partner (BRU 14, BRU29).

The type of the traceability data impacts the appropriate solution used to record the information and later on, to conduct a trace request:

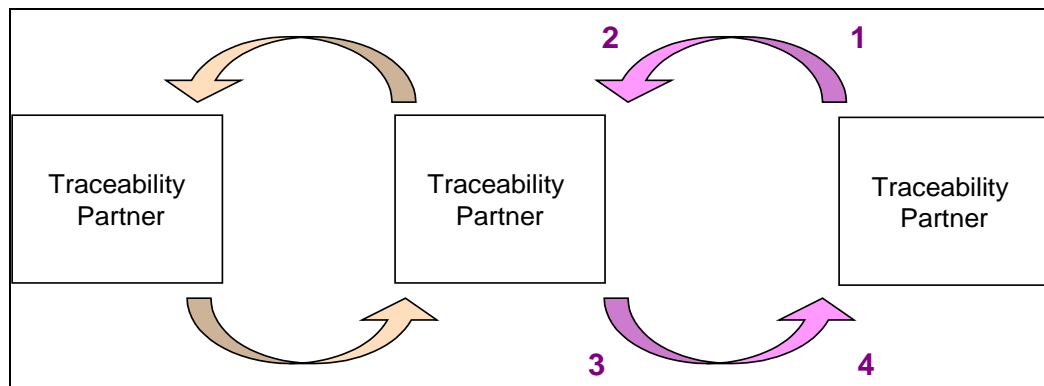
1. If the traceability data is private, it is likely to be in the traceability records of one of the previous or subsequent trading partners.
2. If the traceability data is public, it may be in the traceability records of the traceable item holders (successive traceable item sources and recipients) or published to a shared database, e.g. EPCIS.
3. If the traceability data is a key for the identification of the traceable item, it should be on the identification carrier (BR 6).

Figure 6-9 Where is the Traceability Data?


6.1.2.5. Trace Request

A trace request is a formal inquiry about history, application or location of a traceable item. Any Traceability Partner can initiate a trace request (e.g., a customer, a producer).

A trace request starts when a Traceability Partner is looking for information about a traceable item and this information is not available internally (BR 17, BR 18). The trace may be initiated by a Traceability Partner as a result of a request from the authorities, an end user inquiry or an adverse healthcare event.

Figure 6-10 Trace Request


A Trace Request Initiator must contact the source of the traceable item and through a repetitive process via each link in the supply chain, the Traceable Item Creator, Brand Owner or Licensee will be contacted (BRU 17, BRU 24). The logic of the trace request is that it follows the same path as the information flow (Fig. 6.10). 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.

The Traceability Data Source must reply as quickly as possible to the enquiry (BRU 25). The time period allowed may be defined in local regulations or commercial agreements.

A trace request may trigger subsequent trace requests up or down several levels of the supply chain in order to fulfil the original request (BRU 26). 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.

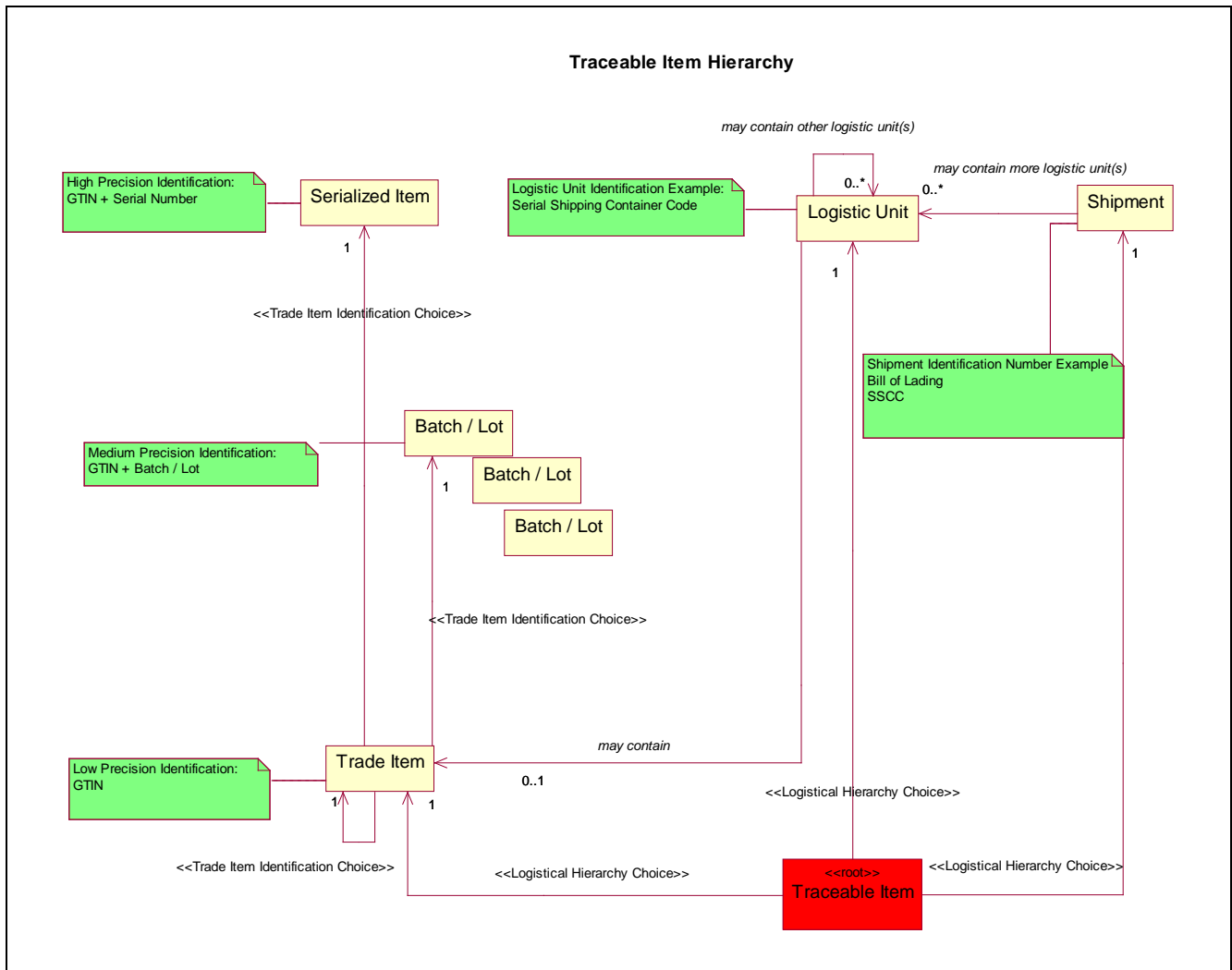
A reply may include all the data required, part of that data or may say that no information is available. There are many types of trace request; they depend on the specific business need and use of the information. For example:

- What are the ingredients of this traceable item? (e.g. inquiry about possible contaminant or allergen which is not mentioned on the label)
- Where are these traceable items located? (e.g. inquiry about the status of delivery or of product recall)
- Which traceable items have been created using this specific traceable item pallet of origin or batch of raw material? (e.g. to facilitate product withdrawal)

The relevant trace request scenario, data and messages can be precisely defined only in the context of a specific business need or application.

6.1.2.6. Traceable Item Hierarchy

Figure 6-11 Traceable Item Hierarchy



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 may be a

- Shipment
 - May contain one or more logistics unit(s)
- Logistics unit
 - May contain other logistics unit(s)
 - May contain one or more trade item(s)
 - May be a trade item
- Trade item
 - Trade item
 - Batch / Lot of trade items
 - Serialized trade item
- Any item that traceability partners agree is a traceable item

The level of traceable item is a combination of logistical hierarchy levels and the precision of the identification.

Here are some logistical examples:

<u>Shipment:</u>	Truck Load, Vessel, 10 pallets of various items
<u>Logistics unit:</u>	Pallet, Container
<u>Trade item not crossing the POS:</u>	Carton, Bag
<u>Trade item crossing the POS:</u>	Consumer Unit

Figure 6-12 Traceable Item Matrix

Precision of the identification		↑			
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	
	Generic	Not applicable	Not applicable	GTIN	
		→			
		Shipment	Logistic Units	Trade Item not crossing the point of sale	Trade Item crossing the POS, Consumer unit
		→			
		Level in the logistical hierarchy			

The GTIN is the basis for product identification. For the purpose of traceability, this may not be sufficient, requiring additional information to identify a product or grouping of products. This concept is indicated in the yellow shading in Figure 6-12.

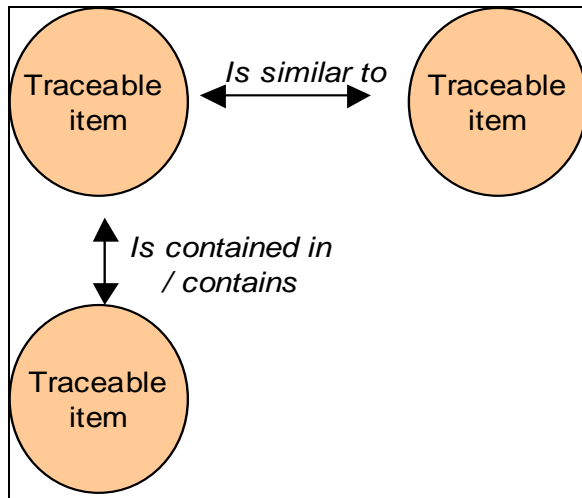
Assumptions for the traceable item matrix / hierarchy:

- Traceable items may need to be physically marked with a Batch / Lot Number to comply with legal requirements, e.g. pharmaceutical products
- Where appropriate, a Best Before Date should be added, e.g. chilled and fresh food
- 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 surgical instrument
- A Serial Number may be appropriate for items not crossing the point of sale that need to be traced at this level, e.g. a tray of fruit or vegetables, a carton of meat or a medical infusion pump.

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

A traceable item may be related to another traceable item, for example:

- Is contained in
- Contains (reverse process is possible, e.g., a carton contains 50 T-shirts)
- Is similar to
- Is composed of (reverse process is not possible, e.g., a cake is composed of sugar, eggs...)
- Manufactured just before
- Manufactured just after

Figure 6-13 Traceable Item Relationship Examples


A traceable item could exist in multiple locations at the same time. For example; the traceable item is identified at the trade item and batch level and is stored by or has been sold to many trading partners.

6.1.3. Current Business Scenario (“as is”)

The performance goal of the traceability process is for Traceability Partners to be able to retrieve information about the history, application or location of a traceable item from any point in the supply chain.

It is composed of:

A. Plan and Organize (pre-requisite)

Output: All Traceability Partners have determined how to assign, collect, share, and keep agreed traceability data. The Traceability Partners have determined how to manage links between inputs, internal processes, and outputs.

B. Align Master Data

Output: All Traceability Partners have aligned their master data.

C. Record Traceability Data

Output: Traceability Partners can identify traceable items and collect and record relevant and agreed traceability data about them as they move across the supply chain.

D. Request Trace

Output: The traceability data is available and Traceability Partners can provide agreed, readable, comprehensive, accurate and timely information to an authorized party upon request about a traceable item.

The trace request involves communication of data that has been collected and recorded. A trace request may be initiated weeks, months or years after a traceable item has been processed, consumed or used. The types of trace request that traceability partners wish to conduct determines the traceability data that traceability partners must communicate. For example, quality records are not necessary to locate logistics units but may be relevant if the objective is to clarify the origin of a product safety problem.

E. Use information

The use of the information that results from a trace request may be, for example, to resolve a quality issue or to inform traceability partners.

Example: In the case of product withdrawal or recall, a traceability partner sends a trace request upstream in order to identify the cause of the problem and to find out which traceable items may have the same problem. Then there is a downstream trace request in order to locate the products and a notification to trading partners who have received them.

The traceability system is defined as the tools and organisation necessary to implement the traceability process in a given environment, party or group of parties.

Current business scenario depicted in [Figure 6-14](#) below.

Figure 6-14 – Use Case Actor Matrix

Use Case	Plan and Organize		Align Master Data				Record Traceability Data						Request Trace			Use Information		
	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 asset as appropriate.	6. Assign identification to trade item	7. Exchange Master Data	8. Assign Identification to the traceable item when it is created.	9. Apply the identification to the identification carrier on the traceable item or in an accompanying document when a transformation takes place.	10. Capture the identification of the traceable item or the asset containing it from the identification carrier when despatching and receiving the traceable item.	11. Collect all other data including traceability information from internal and external sources by any method.	12. Share relevant traceability data (send information by any method).	13. Store traceability data.	14. Initiate the trace request	15. Receive the Trace Request	16. Send a Response.	17. Receive a Response	18. Take action
Physical Process Flow Roles																		
Traceable Item Creator	X	X	X	X	X		X	P	P	X	X	X	X	X	X	X	X	X
Traceable Item Source	X	X	X	P	X		X			P	X	X	X	X	X	X	X	X
Traceable Item Recipient	X	X	X	P	X		X			P	X	X	X	X	X	X	X	X
Transporter	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X
Information Process Flow Roles																		
Brand Owner	X	X	X	X	X	P	X	X				X	X	X	X	X	X	X
Traceability Data Creator	X	X	X	X	X		X	X			X	X	X	X	X	X	X	X
Traceability Data Source	X	X	X	X	X		X			X	X	P	X	X	X	X	X	X
Traceability Data Recipient	X	X	X	X	X		X			X	P	X	X	X	X	X	X	X
Trace Request Initiator														P			P	X
P: is the primary role responsible for the specific use case.																		
X: designates a role involved in the specific use case.																		

7. Business Requirements and Rules Analysis

7.1. Business Requirements

A business requirement is a statement of need concerning the business area or business process under study. It is something that the system must do or a quality that the system must have. A requirement exists either because the type of product demands certain functions or qualities, or the client wants the requirement to be part of the delivered product.

To keep consistent with the three major activities the following abbreviations are used in the number column for the Business Requirements.

- AMD→Align Master Data
- RTD→Record Traceability Data
- RT→ Request Trace

Key Words

- **MUST = Mandatory** - This word, or the terms “REQUIRED” or “SHALL” means that the definition is an absolute requirement of the specification.
- **MAY= Optional** - This word, or the adjective “OPTIONAL”, means that an item is truly optional.

The Corresponding Use Case(s) should be referenced [Figure 6-14](#)

Table 7-1 Business Requirements

Number	Business Requirement	Rationale	Corresponding Standard(s)
<i>BR 1</i> (AMD)	Any internal or external location which 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. It is the choice of the Traceability Partner which location level they uniquely identify.	For unique identification of location. Corresponding Use Case(s): 3,4	[Ref 1] GS1 General Specifications GLN
<i>BR 2</i> (RTD)	Trading Partners MUST be globally and uniquely identified. It is the choice of the Traceability Partner which actor level they uniquely identify, e.g. the Legal Entity.	Identifying the actor to whom a trace request must be directed, will expedite the collection of the traceability information. Corresponding Use Case(s): 7, 11, 12, 14	[Ref 1] GS1 General Specifications GLN Party role list for messages
<i>BR 3</i> (AMD)	Any traceable item, which needs to be tracked forward or traced back between traceability partners, MUST be globally and uniquely identified. This applies to any level of the Product Hierarchy for example, Consumer Unit or a traceable Item	For unique identification of a traceable item Corresponding Use Case: 6	[Ref 1] GS1 General Specifications GTIN

Number	Business Requirement	Rationale	Corresponding Standard(s)
	not crossing the point of sale		
<i>BR 4 (AMD)</i>	Any asset, which needs to be tracked forward or traced back, MUST be globally and uniquely identified.	For unique identification of the asset Corresponding Use Case: 5	[Ref 1] GS1 General Specifications, GRAI (Global Returnable Asset Identifier) and GIAI (Global Individual Asset Identifier)
<i>BR 5 (RTD)</i>	The identification of the traceable item MUST be assigned, at the latest, when physically created. 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. When the traceable item is a logistic unit, it MUST be uniquely identified. It is the choice of the Traceability Partner which identification level to use for the traceable item	For unique identification of the traceable item Corresponding Use Case: 8	[Ref 1] GS1 General Specifications GTIN GTIN + Batch / Lot Number GTIN + Serial Number/SGTIN Logistic Unit – SSCC Best Practice At minimum this information must be displayed in human readable form. For example printed on the product/label or accompanying document or electronic record.
<i>BR 6 (RTD)</i>	All instances of a traceable item must carry a globally unique identification directly on the traceable item or, if not possible, at least on the asset containing it or in an accompanying document.	To carry the globally unique identification. Corresponding Use Case: 9	[Ref 1] GS1 General Specifications If the traceable item is Trade Item: GTIN Batch / Lot of trade item: GTIN + Batch / Lot Number Serialized Trade Item: GTIN + Serial Number, SGTIN Logistic Unit: SSCC Shipment: Shipment Identification Number Best Practice : The traceable item identification should be at least one of the following: electronically held electronically transmitted Machine readable on the identification carrier.
<i>BR 7 (RTD)</i>	The Brand Owner MUST ensure the unique identification of the traceable item.	The Brand Owner is the party responsible for allocating GS1 System numbering and bar code symbols or EPC tag	[Ref 1] GS1 General Specifications

Number	Business Requirement	Rationale	Corresponding Standard(s)
		to a given item. Corresponding Use Case: 8	
<i>BR 8 (RTD)</i>	The identification carrier MUST remain on or attached to the traceable item <i>until the end of life of the traceable item.</i>	For unique identification of the traceable item throughout its life cycle. Corresponding Use Case(s): 9,10	[Ref 1] GS1 General Specifications Allocation Rules and Labelling
<i>BR 9 (RTD)</i>	The identification carrier MUST remain on or attached to the traceable item when it is packed in an upper level of packaging.	For unique identification of the traceable item throughout the packaging hierarchy. Corresponding Use Case(s): 9,10	[Ref 1] GS1 General Specifications Allocation Rules and Labelling
<i>BR 10</i>	The identification carrier MUST carry some information to link with at least one Traceability Data Source (e.g. Brand Owner, importer,).	This allows a traceability partner to identify a data source so that a trace request can be directed to it. Corresponding Use Case: 14	GS1 Logistics Label
<i>BR 11 (RTD)</i>	All Traceable Item Sources and Traceable Item Recipients MUST collect the identification of the traceable item or asset containing it from the identification carrier.	To follow the path of a traceable item Corresponding Use Case: 10	
<i>BR 12 (RTD)</i>	Traceability Partners MUST agree on at least one common level of traceable item and for this common level agree on the set of consistent traceability data to be exchanged.	The traceability Partners will exchange traceable items with each other and ensure that these goods are uniquely identified to manage links between inputs, internal processes, and outputs. Corresponding Use Case(s): 8 to 13	With Bar-Codes: If the traceable item is a trade item crossing the point of sale (consumer unit): EAN/UPC, GS1 DataBar* If the traceable item is a trade item not crossing the point of sale (grouping of trade items): GS1-128, ITF-14, GS1 DataMatrix, GS1 DataBar*, EAN/UPC (excluding EAN-8), according to the application guidelines described in the GS1 General Specifications. If the traceable item is a Batch / Lot of trade items not crossing the point of sale: GS1-128, ITF-14, GS1 DataBar*, EAN/UPC (excluding EAN-8) If the traceable item is a serialized trade item not crossing the point of sale: GS1-128, ITF-14, GS1 DataBar*, EAN/UPC (excluding EAN-8) If the traceable item is a logistic unit: GS1-128, GS1 DataBar*

Number	Business Requirement	Rationale	Corresponding Standard(s)
			<p>If the traceable item is a shipment: GS1-128.</p> <p>[Ref 1] General Specifications section 4</p> <p>With RFID*:</p> <p>900 MHz class 0 Radio Frequency (RF) Identification Tag</p> <p>860 - 930 MHz Class 1 Radio Frequency (RF) Identification Tag Radio frequency & Logical Communication Interface Specification</p> <p>Class - 1 Generation 2 UHF</p> <p>EPC Global Air Interface Protocol</p> <p>EPC Tag Data Standard</p> <p>* The technical and data specifications related to GS1 DataBar and EPC are approved by GS1. GS1 DataBar is approved for restricted global application. Both GS1 DataBar and EPC are being considered for application standards but are currently not solutions for an open use.</p>

Number	Business Requirement	Rationale	Corresponding Standard(s)
<p><i>BR 13 (RTD)</i></p>	<p>All Traceable Item Source(s) and Traceable Item Recipient(s) MUST record and MAY share the following data elements (often recorded within shipment identification documents):</p> <p>TRADING PARTNER IDENTIFICATION:</p> <p>Traceable Item Source Identification</p> <p>Traceable Item Recipient Identification</p> <p>Traceability Data Source Identification</p> <p>Traceability Data Recipient Identification</p> <p>TRACEABLE ITEM IDENTIFICATION AND DETAILS:</p> <p>Traceable Item Identification</p> <p>Traceable Item Description</p> <p>Traceable Item Quantity</p> <p>Date of Despatch and or Receipt</p>	<p>These are the minimum data requirements necessary to perform traceability to manage links between inputs, internal processes, and outputs. Each industry should consider whether an extension to this minimum data set is required to meet their specific data requirements. See section 11 "Implementation Considerations".</p> <p>Corresponding Use Case(s): 12,13</p>	<p>Business Message Standards</p> <p>Global Data Dictionary (GDD)</p> <p>EANCOM</p> <p>GS1 Application Identifiers</p> <p>GS1 Symbolologies</p> <p>Best practice</p> <p>All instances of a traceable item must carry a globally unique identification.</p> <p>When a Batch / Lot Number is required to ensure traceability, this Number should be recorded.</p> <p>The product identifier (GTIN) serves as a reference to the full body of product information; examples include description, ingredients, handling requirements, product life.</p> <p>There is no need to duplicate existing records for traceability. For example, a shipment identification serves as a reference to other data elements such as « Ship from », « Ship to », « Date of despatch », « Unit of measure »...</p> <p>Examples of shipment identification:</p> <p>Bill of Lading Number</p> <p>Despatch Advice Number</p> <p>Invoice Number</p> <p>Packing Slip Number</p> <p>Container Number</p> <p>Proof of delivery</p> <p>Refer to BRU 25 for rationale and BR 6 for corresponding standards to Traceable Item identification.</p> <p>Note: The traceability Data Source and Traceable Item Source are often the same</p>

Number	Business Requirement	Rationale	Corresponding Standard(s)
<i>BR 14 (RTD)</i>	All Traceable Item Creators, Sources and Recipients MUST record the linkage between Traceable Items created, received, processed and / or dispatched.	Traceability requires the management of successive links between what is received, produced, packed, stored and shipped across the entire supply chain. Corresponding Use Case: 13	Global Data Dictionary GS1 best practices used internally Example Batches of trade items contained in a pallet Trade items used as ingredients for a finished good Pallets that have been involved for picking and creating a new pallet
<i>BR 15 (RTD)</i>	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.	The Brand Owner is the party responsible for allocating GS1 System numbering and for replying to trace requests about the traceable item details. Resolving a trace request may require the Traceable Item Source to share information with the Brand Owner or other Traceability Partners. Corresponding Use Case: 12	EANCOM message QUALITY
<i>BR 16 (RTD)</i>	The traceable item identification MUST appear in all accompanying documents or messages containing information related to the traceable item.	Ensure reliability of traceability data to avoid mistakes with manual data entry. It allows the Traceability Partner to cross check the information included in all documents. Corresponding Use Case(s): 11 To 13	None
<i>BR 17 (RT)</i>	Any Traceability Partner MAY send a trace request to a Traceable Item Source, Traceable Item Recipient, Traceability Data Source or Traceability Data Recipient.	The trace request may be initiated by any Traceability Partner as the suspected problem can originate from anywhere in the supply chain. Corresponding Use Case(s): 14,15	None
<i>BR 18 (RT)</i>	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 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)	These are the minimum data requirement for the trace request. Corresponding Use Case(s): 14 To 17	None

Number	Business Requirement	Rationale	Corresponding Standard(s)
	Date / Time, period of time Process or event identification (or some process attributes)		
<i>BR 19</i>	Traceability data MUST be archived and readable for a minimum period that is set by regulation (e.g. law), business practice (e.g., internal policy, contract), or industry agreement or GS1 standards.	Trace requests may occur a long time, years after the information has been collected. Corresponding Use Case: 13	None

7.2. Technical Requirements

Technical requirements are technical constraints or capabilities around business requirements (e.g. "claim reports must be sent via xml"). Technical Requirements include User Interface, Security, Performance, Quality and Backward Compatibility. As this is a *process standard* technical requirements are out of the scope of this document.

7.3. Business Rules

Business rules are statement of **fact** concerning the business area or business process under study that must survive changes to process or data. Business rules are a constraint, in the sense that a business rule lays down what must or must not be the case

Business rules define **what** must be the case rather than **how** it comes to be.

Table 7-2 Business Rules

Number	Business Rule	Details	Corresponding Use Case
<i>BRU 1</i>	Traceability systems and procedures serve the purpose of meeting business, regulatory, and legal requirements by providing access to relevant party and product traceability information.	Rule Type: Definition	All
<i>BRU 2</i>	A traceable item must be one of the following: Shipment Logistic unit Trade item Batch / lot of trade items Serialized trade item Any item that traceability partners agree is a traceable item	Rule Type: Definition	8 to 10

Number	Business Rule	Details	Corresponding Use Case
BRU 3	<p>Traceability data includes information about:</p> <ul style="list-style-type: none"> 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) <p>The following information is NOT within the scope of an external traceability system:</p> <ul style="list-style-type: none"> full recipes or formulas financial or pricing data, employee personal data, patient personal data or research and development data 	<p>Rule Type: Definition</p> <p>Rationale</p> <p>Key questions for traceability</p>	All
BRU 4	<p>Key traceability principles are:</p> <ul style="list-style-type: none"> Unique identification of traceable items Capturing and recording traceability data Sharing traceability data between traceability partners Linking inputs through changes or processing to outputs, be that the same traceable item or a new traceable item 	<p>Rule Type: Definition</p>	All
BRU 5	<p>Traceability is an integral part of the business process. It is not separate from logistical processes and/or product safety / quality programs.</p>	<p>Rule Type: Definition</p>	All
BRU 6	<p>A traceable item may be related to another traceable item.</p>	<p>Rule Type: Definition</p>	8 to 10
BRU 7	<p>Instances of a traceable item may exist in multiple locations at the same time.</p>	<p>Rule Type: Definition</p>	9 to 13 Example: Drugs from the same batch that have been despatched between several customers.
BRU 8	<p>There may be several levels of traceable items at the same time in one shipment with regards to the traceable item hierarchy.</p>	<p>Rule Type: Definition</p>	8 to 17 Example: Refer to Figure 7-1 "Traceable Item Hierarchy"
BRU 9	<p>Traceability data may be master data, constant across time (e.g. GTIN) or event data, changing with each case or shipment (e.g., lot / batch).</p>	<p>Rule Type: Definition</p>	13 to 17
BRU 10	<p>All Traceability Partners must have internal and external traceability to achieve traceability across the supply chain.</p>	<p>Rule Type: Guideline</p>	All

Number	Business Rule	Details	Corresponding Use Case
BRU 11	Every Traceability Partner may decide on HOW to implement internal traceability systems. It is 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.	Rule Type: Guideline	All
BRU 12	Traceability Partners use GS1 standards to ensure fast and accurate flow of information between traceability partners.	Rule Type: Guideline	All
BRU 13	Traceability Partners should not impose proprietary practices on other Traceability Partners.	Rule Type: Guideline	All
BRU 14	It is not necessary for ALL Traceability Partners to store and share ALL traceability information, but they must be able to access and share relevant and agreed information.	Rule Type: Guideline	12 to 17
BRU 15	The minimum information shared between Traceability Partners should be the greater of: 1) minimum requirements defined in this GS1 Global Traceability Standard 2) What is needed for day to day business transactions with traceability partners?	Rule Type: Guideline	12
BRU 16	Each Traceability Partner must define at least one level of traceable item for each shipment.	Rule Type: Guideline	8
BRU 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.	Rule Type: Guideline	11 to 17
BRU 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.	Rule Type: Guideline	8 to 13
BRU 19	A Traceable Item Recipient must know the Traceable Item Source that supplied the traceable item.	Rule Type: Guideline	11 to 13
BRU 20	As long as a traceable item is contained within another traceable item and parent/child relationships are maintained, traceability partners MAY store only records of the movements and location of the higher level traceable item. (Refer to Business Requirement 13)	Rule Type: Guideline	10 to 13

Number	Business Rule	Details	Corresponding Use Case
BRU 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 event flow of information must exactly reflect the physical movement. This linkage is necessary for the traceable item to be traced from point of origin or manufacture to the point of sale or use or user (if relevant). Conversely, this linkage must also ensure that product can be traced back through the supply chain.	Rule Type: Guideline	11 to 13
BRU 22	The Traceable Item Recipient may collect information from both the previous Traceable Item Source and the previous Transporter source (land, ocean, rail or air).	Rule Type: Guideline	10 to 13
BRU 23	The Traceable Item Source may communicate information to both the Traceable Item Recipient and the subsequent Transporter (land, ocean, rail or air).	Rule Type: Guideline	10 to 13
BRU 24	A Trace Request Initiator must contact its Traceability Partners, including the Brand Owner where appropriate	Rule Type: Guideline	14
BRU 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.	Rule Type: Guideline	16, 17
BRU 26	A Trace Request may trigger subsequent trace requests up or down the supply chain in order to fulfil the original request.	Rule Type: Guideline	14,15
BRU 27	A traceability system is only as good as its weakest link. If failure occurs at any point, traceability breaks down.	Rule Type: Guideline	All
BRU 28	Various industries, regions or countries may have additional Business Requirements beyond this generic GS1 Global Traceability Standard. These should be addressed by defining specific extensions.	Rule Type: Guideline	All
BRU 29	Access to and sharing of information does NOT include intellectual property of each traceability partner	Rule Type: Guideline	12 to 17
BRU 30	Traceability Partners MAY choose a specific, key data element, e.g. purchase order number, to enable access to data and/or information related to an event of a traceable item.	Rule Type: Guideline	

8. Structured Business Scenarios

8.1. Structured Business Scenario for *Perform Traceability*

The generic traceability framework is broken down into three main activities.

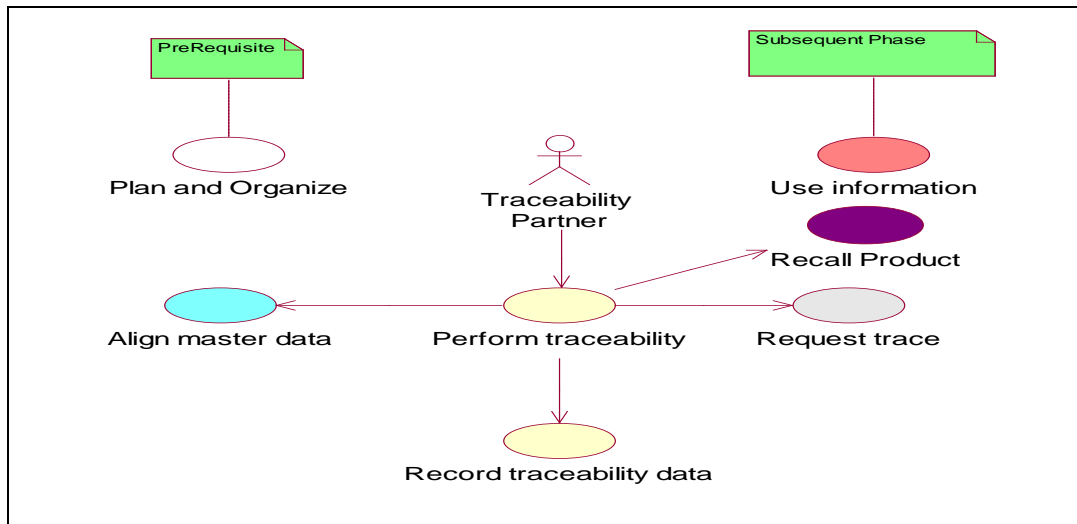
- Align Master Data
- Record Traceability Data
- Request Trace
- Recall Product

The Plan and Organize use case is a prerequisite phase and Use Information use case is subsequent phase, and they are out of scope.

The Use Case Diagram (Figure 8.1) depicts the Traceability Partner's interaction with key processes in the traceability process. The use case diagram is a pictorial representation for Figure 6.14 Use Case Actor Matrix. The icons are colour coded Blue (Align Master Data), Yellow (Record Traceability Data), Purple (Recall Product), and Grey (Request Trace). Therefore, at the highest level to perform traceability, the Traceability Partner's must Plan and Organize, Align Master Data, Record Traceability Data, Request Trace, Recall Product and lastly Use Information. The Use Case Description boxes are a textual representation drilling down to the sub processes for each figure 8.1-8.4.

8.1.1. Use Case Diagram: Perform Traceability

Figure 8-1 Use Case Diagram: Perform Traceability



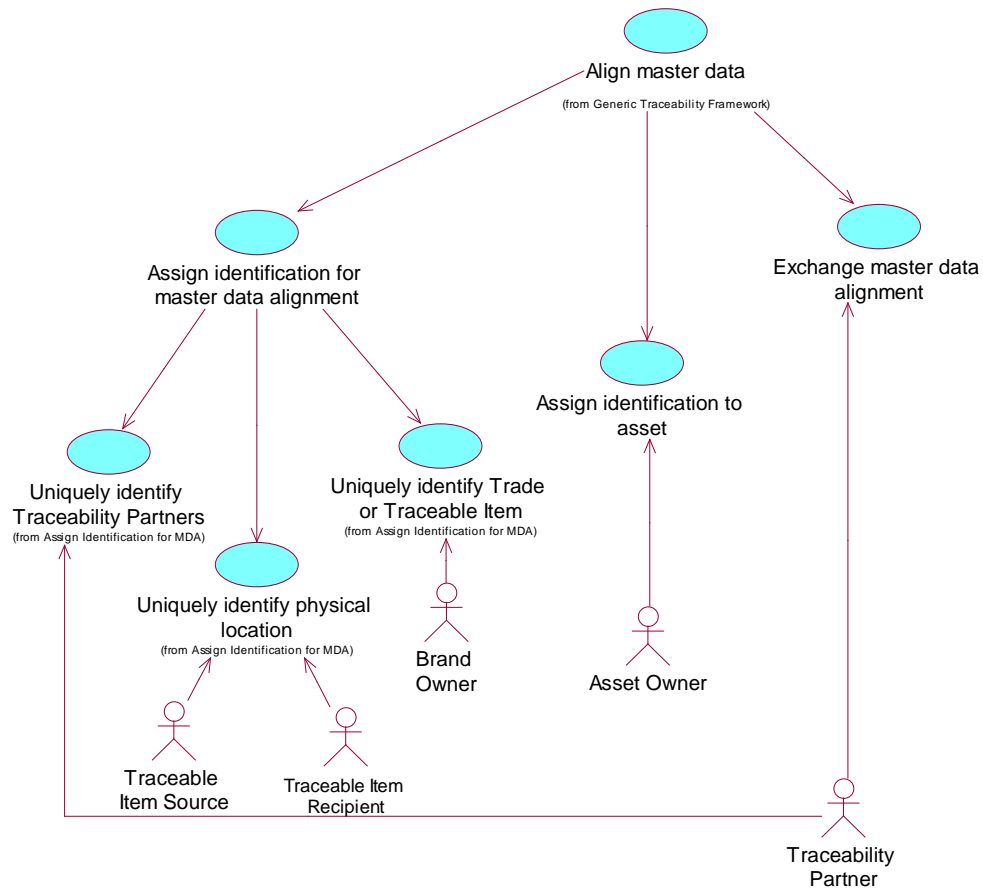
Use Case ID	UC-1
Use Case Name	Perform traceability
Use Case Description	Provides the processes involved to perform traceability.

Actors (Goal)	<p>Traceability Partner's goal is to perform traceability.</p> <p>Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, Traceability Data Recipient, and Trace Request Initiator.</p> <p>Product Recall Initiator, Product Recall Approver, Product Recall Recipient</p>
Performance Goals	<p>The ability to track and trace items across the supply chain. At each step in the process there is basic data that needs to be collected from Traceability Data Source and kept and shared with Traceability Data Recipient. All Traceability Partners involved in the supply chain must systematically associate the physical flow of materials, intermediate and finished products with the information flow. To ensure the continuity of the information flow, each Traceability Partner must communicate pre-defined and agreed traceability data to the next Traceability Partner.</p>
Preconditions	<p>Traceability Partners in the supply chain have planned and organized their systems and processes to perform traceability.</p>
Post conditions	<p>Traceability Partners in the supply chain are able to perform traceability.</p>
Scenario	<p><u>Perform Traceability</u></p> <p>Begins when: Traceability Partner wishes to conduct future business.</p> <p>(Template Form)</p> <p>Continues with...</p> <p>Step #</p> <p>Primary Actor</p> <p>Secondary Actor (If necessary)</p> <p>Activity Step</p> <p>Step: 1</p> <p>Actor: Traceability Partner</p> <p>Activity Step: Align master data</p> <p>Step: 2</p> <p>Actor: Traceability Partner</p> <p>Activity Step: Record traceability data</p> <p>Step: 3</p> <p>Actor: Traceability Partner</p> <p>Activity Step: Request Trace</p> <p>Ends when: The trace request initiator receives the requested information or receives the message that the information cannot be found unless the following step is enacted.</p> <p>Step: 4</p> <p>Actor: Traceability Partner</p> <p>Activity Step: Recall Product</p> <p>Ends when: The Product Recall Closeout Acknowledgement is returned to the Product Recall Initiator.</p>

Alternative Scenario	No alternative scenarios
Related Requirements	Related Business Requirements contained in sub use cases.
Related Rules	Related Business Rules contained in sub use cases.

8.1.2. Use Case Definition: Align Master Data

Figure 8-2 Use Case Diagram: Align Master Data

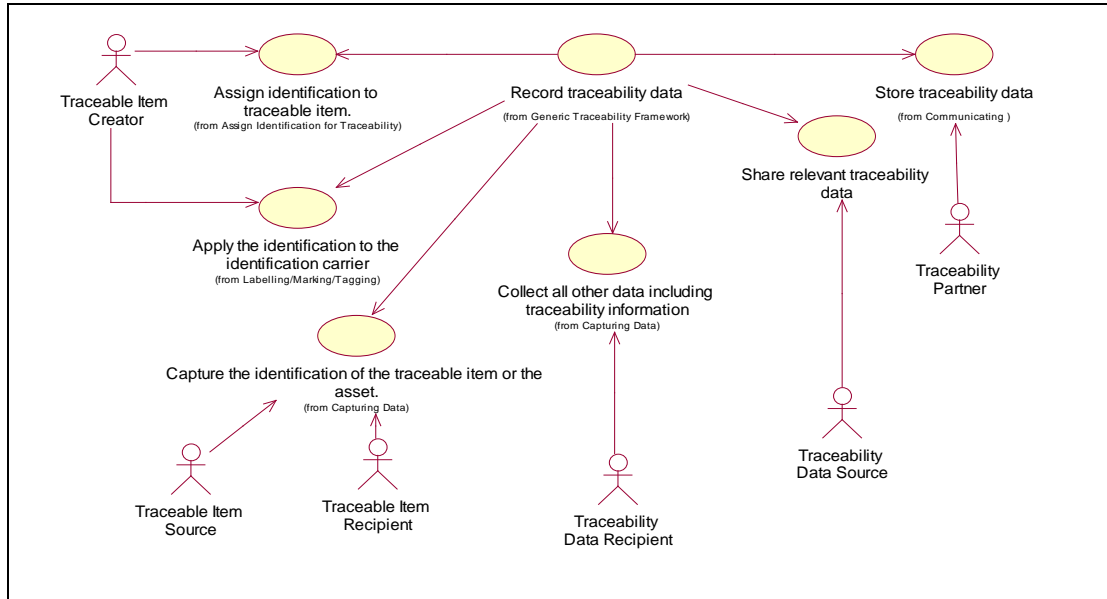


Use Case ID	UC-1.1
Use Case Name	Align master data
Use Case Description	Provides the processes to align master data.
Actors (Goal)	Traceability Partner's goal is to align master data.
Performance Goals	The ability to align master data to ensure traceability can be performed.
Preconditions	Traceability Partners in the supply chain wish to align master data.

Post conditions	Traceability Partners in the supply chain are able to exchange aligned master data.
Scenario	<p><u>Align Master Data</u> Begins when: Traceability Partner wishes to align master data.</p> <p>Step: 1 Primary Actor: Traceability Partner Activity Step: Assign identification to the party.</p> <p>Step: 2 Primary Actor: Traceable Item Source and Traceable Item Recipient. Secondary Actor: Traceable Item Creator, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, Traceability Data Recipient, and Trace Request Initiator Activity Step: Assign identification to the physical locations.</p> <p>Step: 3 Primary Actor: Traceability Partner Activity Step: Assign identification to the assets.</p> <p>Step: 4 Primary Actor: Brand Owner Activity Step: Assign identification to the traceable item</p> <p>Step: 5 Primary Actor: Traceability Partner Activity Step: Exchange Master Data</p> <p>Ends when: Master data alignment has been achieved.</p>
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements: 1-4
Related Rules	Business Rules: 1-7, 9-14, 27, 28, 29

8.1.3. Use Case Definition: Record Traceability Data

Figure 8-3 Use Case Diagram: Record Traceability Data

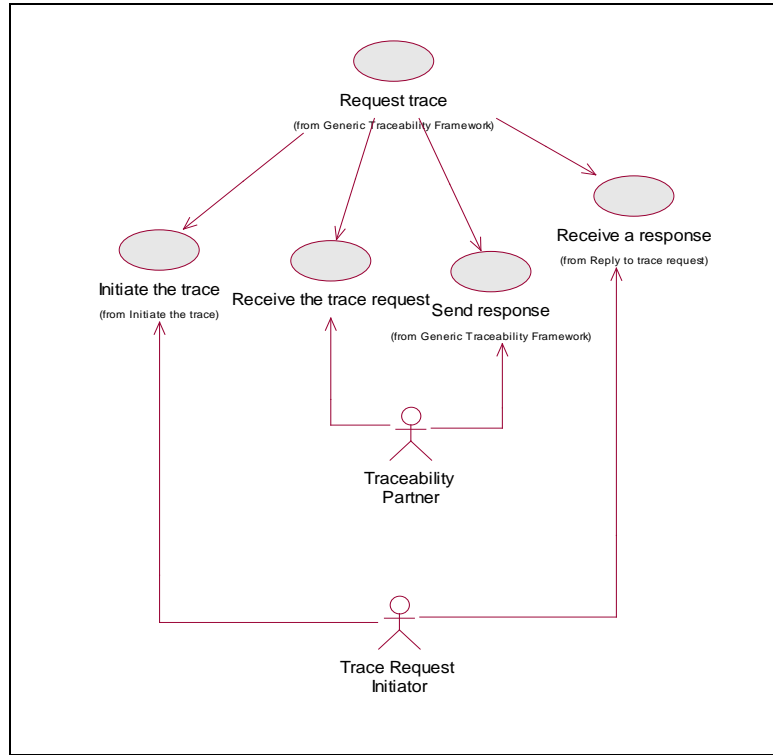


Use Case ID	UC-1.2
Use Case Name	Record traceability data
Use Case Description	Provides the processes involved to record traceability data.
Actors (Goal)	Traceability Partners can identify traceable items and collect and record relevant and, at a minimum, agreed traceability data as traceable items move across the supply chain.
Performance Goals	The ability to identify traceable items, collect and record relevant and, at a minimum, agreed traceability data as traceable items move across the supply chain.
Preconditions	Master Data has been aligned.
Post conditions	Traceability Partners are able to fulfil a trace request.

Scenario	<p><u>Record Traceability Data</u></p> <p>Begins when: Manufacturer needs to create additional inventory, or Vendor Managed Inventory triggers inventory creation request.</p> <p>Step: 1 Primary Actor: Traceable Item Creator Secondary Actor: Brand Owner and Traceability Data Creator Activity Step: Assign identification to traceable item. A traceable item is a physical object where there may be a need to retrieve information about its history, application, or location. Reference section 6.1.2.5 for details.</p> <p>Step: 2 Primary Actor: Traceable Item Creator Activity Step: Apply the identification to the identification carrier on the traceable item or in an accompanying document when a transformation takes place.</p> <p>Step: 3 Primary Actor: Traceable Item Source and Traceable Item Recipient Secondary Actor: Traceable Item Creator, Transporter, Traceability Data Source, and Traceability Data Recipient Activity Step: Capture the identification of the traceable item or the asset containing it from the identification carrier when despatching and receiving the traceable item.</p> <p>Step: 4 Primary Actor: Traceability Data Recipient Secondary Actor: Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Traceability Data Creator, and Traceability Data Source Activity Step: Collect all other information including traceability information from internal and external sources by any method.</p> <p>Step: 5 Primary Actor: Traceability Data Source Secondary Actors: Traceable Item Creator, Traceable Item Source, Transporter, and Traceability Data Creator Activity Step: Share relevant and agreed traceability information (send information by any method).</p> <p>Step: 6 Primary Actor: Traceability Partner Activity Step: Store traceability data.</p> <p>Ends when: Deliver to “Back Room” or “Back Door” (The receiving area for the final stage of the point of sale or service) or use or destruction of item or out of scope of traceability process.</p>
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements 5-16, 19
Related Rules	Business Rules 1-14, 15-23, 27, 28, 29

8.1.4. Use Case Definition: Request Trace

Figure 8-4 Use Case Diagram: Request Trace

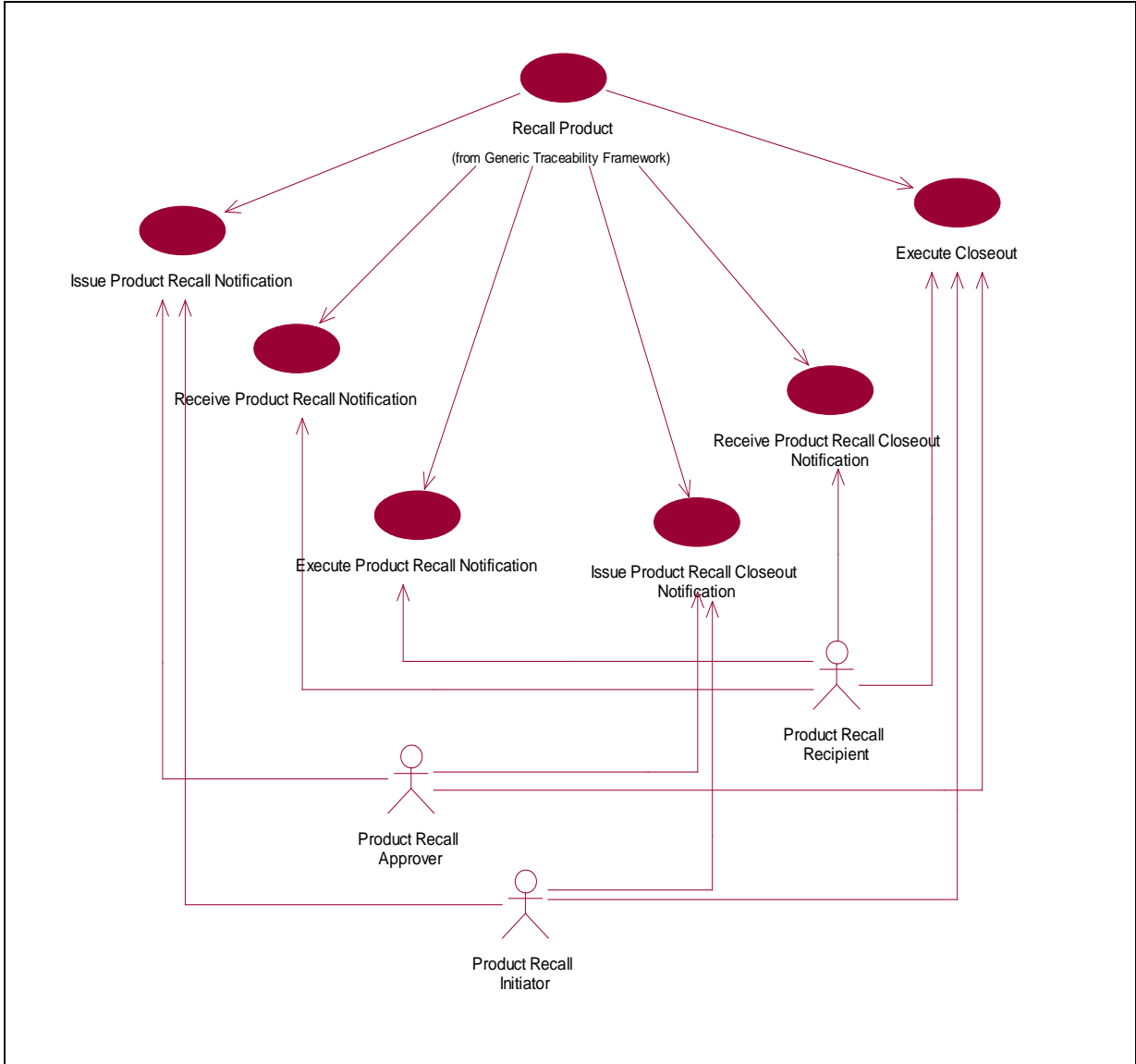


Use Case ID	UC-1.3
Use Case Name	Request trace
Use Case Description	Provides the processes involved to request a trace.
Actors (Goal)	Traceability Partner's goal is to fulfil the trace request.
Performance Goals	The information is available and traceability partners can provide agreed, comprehensive, accurate and timely information to an authorized party upon request about a traceable item.
Preconditions	The Traceability Partner recorded traceability data for that traceable item.
Post conditions	Traceability Partner in the supply chain received the information on their request.

Use Case ID	UC-1.3
Scenario	<p><u>Request Trace</u></p> <p>Begins when: There is a need for trace. The information is not available internally, and the information must be requested to external traceability partner.</p> <p>Step: 1 Primary Actor: Trace Request Initiator Secondary Actor: Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Creator, Traceability Data Source, and Traceability Data Recipient. Activity Step: Initiates trace request.</p> <p>Step: 2 Primary Actor: Traceability Partner Activity Step: Receives the trace request.</p> <p>Step: 3 Primary Actor: Traceability Partner Activity Step: Sends a reply against the requested trace.</p> <p>Ends when: The Trace Request Initiator receives information or receives the message that the information cannot be found.</p>
Alternative Scenario	No alternative scenarios
Related Requirements	Business Requirements 17-18
Related Rules	Business Rules 1-7, 9-14, 17-19, 24-29

8.1.5. Use Case Definition: Recall Product

Figure 8-5: Use Case Diagram: Recall Product.



Use Case ID	UC-1.4
Use Case Name	Recall Product
Use Case Description	Provides the processes involved to recall a product.
Actors (Goal)	Product Recall Initiator, Product Recall Approver, Product Recall Recipient goal is to fulfil the Product Recall process.

Use Case ID	UC-1.4
Performance Goals	The traceability partner's goal is to draft and issue a Product Recall Notification, take action regarding the Product Recall Notification, issue a Product Removal Confirmation, draft and issue Product Recall Closeout, and close out the Product Recall.
Preconditions	The Product Recall Initiator confirms there is a need to issue a Product Recall Notification.
Post conditions	Traceability Partners confirms the Product Recall Closeout.
Scenario	<p>Recall Product Begins when: There is a need for Product Recall.</p> <p>Step: 1a Primary Actor: Product Recall Initiator Activity Step: Initiates the draft Product Recall Notification (PRN).</p> <p>Step: 1b Primary Actor: Product Recall Approver Secondary Actor: Product Recall Initiator Activity Step: Product Recall Approver reviews draft PRN and either approves or rejects it. Product Recall Approver approves draft PRN. Product Recall Approver sends approval to Product Recall Initiator and issues PRN to the Product Recall Recipient.</p> <p>Step: 2a Primary Actor: Product Recall Recipient Activity Step: Product Recall Recipient receives PRN and records internally.</p> <p>Step: 2b Primary Actor: Product Recall Recipient Secondary Actor: Product Recall Approver and/or Product Recall Initiator Activity Step: Product Recall Recipient sends Receipt Acknowledgement (RA) Product Recall Approver and/or Product Recall Initiator receive RA. Note some initiator organisation system can automatically receive a message.</p> <p>Step: 3a Primary Actor: Product Recall Recipient Activity Step: Product Recall Recipient begins executing product recall. i) Stops forward logistics ii) Identifies product quantity in control of recipients iii) Defines success criteria iv) Executes reverse logistics or disposal</p> <p>Step 3b Primary Actor: Product Recall Recipient</p>

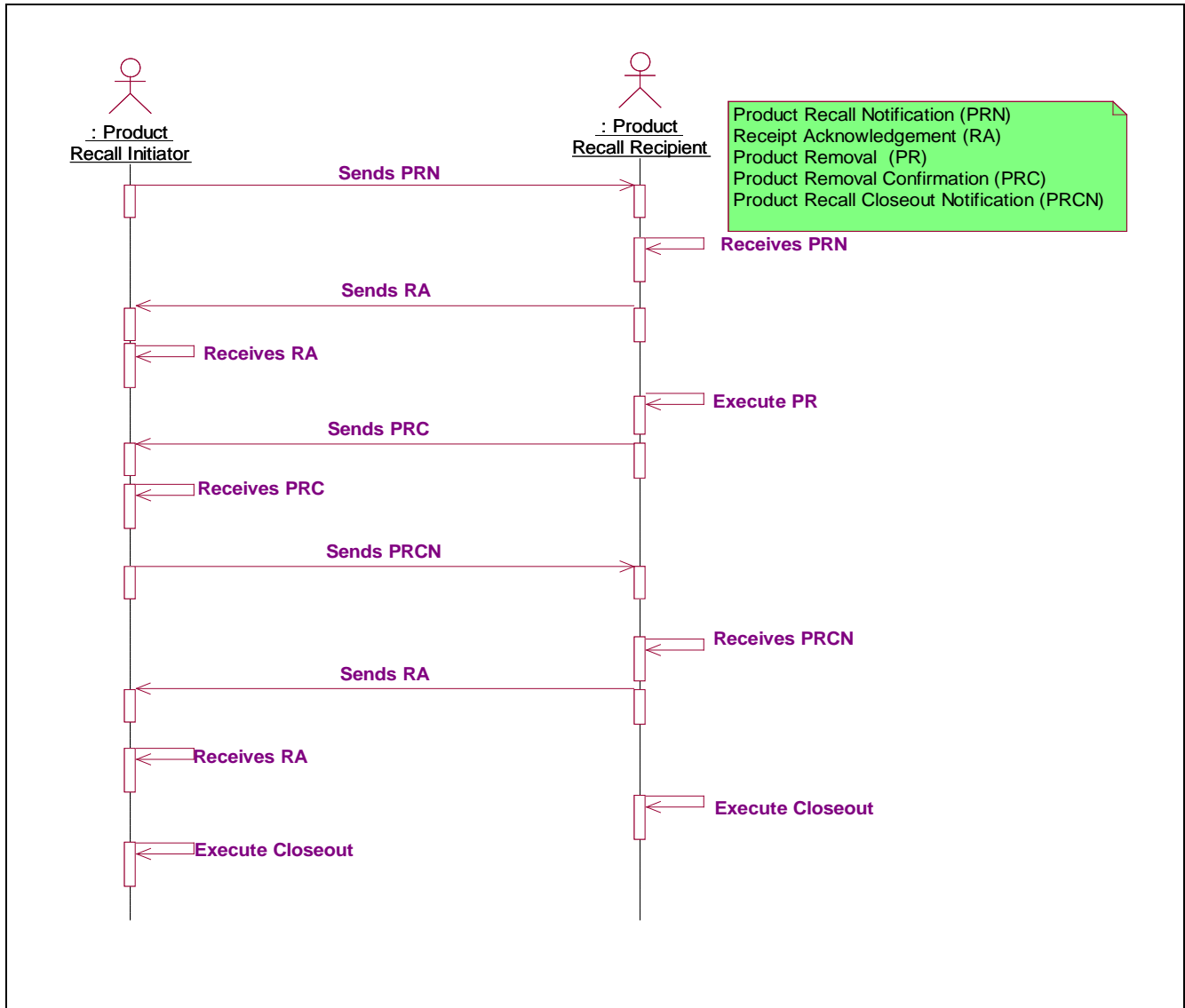
Use Case ID	UC-1.4
	<p>Secondary Actor: Product Recall Approver Activity Step: Product Recall Recipient sends a Product Removal Confirmation (PRC). Product Recall Approver receives PRC.</p> <p>Step 4a Primary Actor: Product Recall Initiator Secondary Actor: Product Recall Approver Activity Step: Product Recall Initiator initiates draft Product Recall Closeout Notification (PRCN). Product Recall Initiator sends draft PRCN to Product Recall Approver</p> <p>Step: 4b Primary Actor: Product Recall Approver Secondary Actor: Product Recall Initiator Activity Step: Product Recall Approver receives draft PRCN from Product Recall Initiator. Product Recall Approver reviews draft PRCN and either approve or reject it. Product Recall Approver approves draft PRCN. Product Recall Approver sends approval to Product Recall Initiator. Product Recall Initiator sends PRCN to Product Recall Recipient.</p> <p>Step: 5a Primary Actor: Product Recall Recipient Secondary Actor: Product Recall Approver Activity Step: Product Recall Recipient receives PRCN Product Recall Recipient records internally</p> <p>Step: 5b Primary Actor: Product Recall Recipient Secondary Actor: Product Recall Approver Activity Step: Product Recall Recipient sends RA Product Recall Approver receives RA</p> <p>Ends: Step: 6 Primary Actor: Product Recall Approver, Product Recall Initiator, Product Recall Recipient Activity Step: Product Recall Approver, Product Recall Initiator, Product Recall Recipient execute closeout.</p>
Alternative Scenario	No alternative scenarios
Related Requirements	
Related Rules	

8.1.6. Activity Diagram

This section is not applicable.

8.1.7. Sequence Diagrams

Figure 8-6 Sequence Diagram: Recall Product



6 Step Initial Product Recall Process.

1. Issue Product Recall Notification
2. Receive Product Recall Notification
3. Remove Product
4. Issue Product Recall Closeout Notification

5. Receive Product Recall Closeout Notification
6. Execute Closeout Record Internally

9. Business Object Analysis

9.1. Business Object Life-Cycle Discussion

The purpose of this section is to identify and explain the minimum agreed data elements, required for a global traceability process standard, that an organisation / industry sector should plan to create, capture, record and be prepared to share agreed data elements with Traceability Partners in the supply chain. (Refer to BR13) Organisations should consider adopting these minimum agreed data elements when selecting, designing and implementing their internal traceability business process.

This minimum level is generic to any GS1 member company:

- Anywhere in the supply chain
- In any industry or industry sector
- In organisations of any size

There is an implicit understanding that traceability partners in a particular industry sector may need to create, capture, record and share agreed, additional information beyond the data elements defined here. Data is created and recorded at many steps along the supply chain. It is not necessary for all of this to be exchanged with every Traceability Partner, but a minimum amount of traceability data must be exchanged to accompany the physical flow of goods. Other data should be recorded and linked within internal traceability records so that it is available to investigate and share as appropriate when a trace request is received. (Refer to section 6.1.2.4 figure 6.8 and to BRU 11)

The minimum information required, and corresponding data elements identified are as follows:

Minimum Information Required	Data Element Required	GS1 Standard
Who is my Traceability Partner?	<p>Source identification and Recipient identification for each relevant party. This includes intermediaries such as carriers or 3rd party logistics providers.</p> <ul style="list-style-type: none"> ■ Parties may serve as a: <ul style="list-style-type: none"> ■ Traceable Item Source ■ Traceability Data source ■ Traceable Item Recipient ■ Traceability Data Recipient <p>The Traceability Data Source and Traceable Item Source are often the same. The Traceability Data Recipient and Traceable Item Recipient are also often the same.</p>	Global Location Number (GLN)

Minimum Information Required	Data Element Required	GS1 Standard
What is the Traceable Item?	<p>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.</p> <p>The data elements required are dependent on the level of traceable item chosen as follows:</p> <p>When the Traceable Item is a Trade Item:</p> <ul style="list-style-type: none"> ■ Trade Item Identification ■ Trade Item Description ■ Trade Item Quantity <p>When the Traceable Item is a batch of trade items :</p> <ul style="list-style-type: none"> ■ Trade Item Identification ■ Batch / Lot Number ■ Trade Item Description ■ Trade Item Quantity <p>When the Traceable Item is a serialised trade item :</p> <ul style="list-style-type: none"> ■ Trade Item Identification ■ Serial Number ■ Trade Item Description ■ Trade Item Quantity <p>When the Traceable Item is an item that traceability partners agree is a traceable item:</p> <ul style="list-style-type: none"> - Item Identification - Item Description - Item Quantity <p>When the Traceable Item is a Logistics Unit:</p> <ul style="list-style-type: none"> ■ Logistic Unit Identification ■ Logistic Unit Quantity <p>When the Traceable Item is a Shipment</p> <ul style="list-style-type: none"> ■ Shipment Identification 	<p>Global Trade Item Number (GTIN) Global Data Dictionary (GDD) trade item attributes</p> <p>Depending on the choice of traceable item, the traceable item identification is (refer to BR 5)</p> <p>Trade Item: GTIN Batch / lot of trade item: GTIN + Batch / Lot Number Serialized trade item: GTIN + Serial Number, SGTIN Logistic unit: SSCC and applications identifiers Shipment: Shipment Identification Number</p> <p>GS1 Application Identifiers</p> <p>Note: as of July 2005, SGTIN only exists for RFID technology using EPC. As bar code solutions a combination of GTIN plus serial number can be found as appropriate counterpart (e.g. GS1 DataMatrix or GS1-128).</p>
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 / despatch it?	Date of receipt and / or date of despatch as relevant depending on the role of the party	EDI DESADV



Important: 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. This requires that each Traceability Partner establishes and records linkages between inputs and outputs (BR 14, BRU 6, BRU 10). While outside the scope of this GS1 Standard, internal traceability best practices are available at, for example, [ref 2] Chapter 6 of *ECR – Using Traceability in the Supply Chain to Meet Consumer Safety Expectations*.

9.1.1. State Diagram(s)

This section is not applicable.

9.1.2. Business Object relationship discussion

This section is not applicable

10. Conceptual Solution (Examples)

The industry specific examples are detailed in their respective Implementation Guideline.

11. Implementation Considerations

This section provides a methodology for an organisation and / or industry sector.

The following key steps should be considered by each organisation and / or industry sector that is considering how to implement best business practices to utilise the recommended approach described in the GS1 Global Traceability Standard.

For examples of application, please refer to the industry specific implementation guidelines.

11.1. Contact your GS1 organisation to get expert advice

Your local GS1 Member Organisation (MO) will provide expert advice about the GS1 Global Traceability Standard and any existing extension, support during your project to implement a traceability policy, plus help to identify technology most suited to your requirements and to help you get an appropriate level of knowledge and training on this technology and the appropriate GS1 Standards.

In the case of an industry sector, you may want to establish a working group with representatives from all types of operators in your industry sector. Your local GS1 MO can host and facilitate such working groups. If an industry sector discovers that it requires an extension to this generic standard, the GS1 MO will advise and support this process.

The list of GS1 MOs may be found at www.gs1.org.

11.2. Model the supply chain where traceability is to be accomplished

It is extremely important to determine the scope of the traceability process in your supply chain, the Traceability Partners who are involved and to clearly identify the boundaries of your traceability model.

Example:

In the Consumer Goods Industry –from the purchase of raw material ingredients and packaging for use as inputs, the internal business processes through to the output and delivery of finished products to the customer Distribution Centre or Retail Store. The scope may include some inputs (such as seeds, meat...) and exclude some others (packaging which is not in contact with the product...).

Check with your local GS1 MO to see if this model already exists within the GS1 community.

11.3. Determine priority business needs

As the data to record and the relevant level of traceable item depends on business needs, it is important to determine at the beginning what the main uses are that you expect from the traceability system and the type of trace request (by data elements) that you want to be able to conduct.

Example:

In case of anti-counterfeiting, a common useful trace request is to be able to retrieve logistic information about a particular unit of product. In that case, the relevant level of traceable item in addition to logistic units is the serialized traceable item.

11.4. Describe the physical flow of products

Identify the type of products that are exchanged between your traceability partners and describe the logistical hierarchy

You may find it helpful to “walk” each step of your supply chain and identify the physical locations, inputs, internal processes, and outputs. The supply chain “map” can be prepared in the form of a diagram or template, providing a record and the basis for a comprehensive traceability plan.

Check with your GS1 MO if all or part of your model has already been defined in the GS1 community and make use of established best practices.

Once the model is completed, the model provides a template like this:

Traceability Partner 1 ←→ --- (process 1-2) --- ↔ **Traceability Partner 2** ←→ --(process 2-n)----
 ↔ **Traceability Partner n** ←-----

Each process represents a particular step in the supply chain and is associated to product inputs and outputs. Each Traceability Partner represents an entity involved in a preceding, current or subsequent step in the chain.

Section 6.1.2. may help to develop this description.

Example:

A logistics operator might have two or more delivery processes: (1) direct store delivery (2) warehouse delivery (3) customer collection. For example, the physical flow between two trading partners may be a truck with bulk goods or a truck containing big bags of seeds.

11.5. Define Traceability Partners’ roles

Associate the roles that each Traceability Partner has according to the GS1 Global Traceability Standard. These roles determine which roles / business processes the Traceability Partner must perform to achieve traceability.

This analysis can be checked and developed by referring to the grid of Roles and “use cases” described in Section 6.1.3 “Current Business Scenario”.

Example:

A Traceability Partner may receive, store and despatch (warehouse keeper / transporter); a Traceability Partner may receive, transform and despatch (a producer) ...

11.6. Model the Process (for each Physical Process that is Relevant)

11.6.1. Identify the level of the Traceable Item

Determine the traceable item level(s) by using your description of the physical flow.

This will be dependent on the organisation/industry sector, Traceability Partner requirements and the level of risk/cost considered appropriate.

If relevant (organisation/industry specific) extension or “GS1 Implementation Guidelines for Implementing Traceability” exist they should be consulted.

A system of classifying risk as ‘High’, ‘Medium’, or ‘Low’ can be used to determine the level of detail required for traceability. Risks can, for example, be financial, affect organisation reputation, impact end user health, etc...Batch management is a best practice used in many businesses and they must define their own batch. In other industry sectors, e.g., pharmaceutical industries and perfumes, Serial Number identification of each individual consumer unit or other trade item is often used to support product authentication and anti-counterfeit strategies.

The traceable item should be defined based on two main variables that help to define the level of risk an organisation is prepared to accept when Traceable Item data is applied to a circumstance such as the need to identify and recall defective product :

- Level of accuracy
- Logistics hierarchy

That is, the traceable item will be that item that fulfils both: on one hand it achieves the level of accuracy that reflects the organisation’s required risk profile and on the other, it represents the logistic unit / traceable item where traceability is to be applied.

To help in the decision-making, the traceable item hierarchy can be developed by referring to [Figure 6-11](#) and [Figure 6-12](#) in Section [6.1.2.6, Traceable Item Hierarchy](#). The BR 5 presents the corresponding identification standards.

Date information may be used to facilitate “First In First Out” warehouse management systems and to manage the sequence of sales / use by unit at the point of sale / consumption / use. Application Identifiers for appropriate date information are available in GS1-128 labelling. However, “Best Before Date”, “Use By Date” or “Expiry Date” are useful data elements but are not normally used as a key identification for traceability purposes since they may not carry sufficient information as the Batch / Lot or Serial Number.

Example of traceable item: bulk goods, batch of crop, Logistic Unit, serialised carton of beef products, batch of bottles of milk.

11.6.2. Decide on the traceability information needed for each type of Traceability Partner.

The GS1 Global Traceability Standard identifies a number of data attributes that should be created, collected, recorded, agreed and shared between Supply Chain Partners to ensure best practice in a traceability plan (GTIN, Batch / Lot Number, SSCC...)

You may need to create, collect, record, agree and share a wide range of other data elements that are appropriate for your organisation and Traceability Partners, according to legislation or specific supply chain requirements, and you need to identify these elements and plan how to ensure that appropriate arrangements can be established and maintained.

Implementation of data synchronisation processes enables the exchange of master data about party and item (product) efficiently and accurately. This can be supplemented with the necessary relationship dependent and event data as appropriate.

The minimum data requirements can be checked in BR 13. They are explained in Section 9 “Business Object Analysis”.

11.6.3. Select the enabling technology to support traceability

Some use case and traceability requirements are technology independent (e.g. assigning the identification to the traceable item, list of minimum data to record).

Yet you need to select an appropriate enabling technology to attain traceability and data exchange based on the model of your supply chain process.

Use case (section 6.1.3)	Possible enabling technologies
Identification carrier	Ink jet, label, tag, accompanying document It can be human readable or machine readable (bar codes, RFID...)
Collect and share data	Label, Marking, EDI, Facsimile, Internet, Phone, Data Base, Physical inspection, Accompanying document...
Store data	Notebook, data base (internal or from a service provider via Internet)
Manage a trace request	Phone, e-mail, Facsimile, GEPIR (www.gepir.org), GDSN, EPCIS and electronic catalogues may be used for trace requests.

For each enabling technology, there are corresponding standards.

The following enablers are examples of the most common “technological models”, but there are many other alternatives:

Model	Technology	Comments
Traceability information is sent with the physical object	Paper	No automatic process.
	GS1-128*	All traceability information is included in the GS1-128 label (GTIN, Batch / Lot Number, Best Before Date,)
Traceable item is identified by batch/lot or serialised and traceability information is sent with the physical object or exchanged by any other means	GS1-128+ EDI/XML	GS1-128 logistic unit label only needs to have an SSCC although for homogenous pallets additional attributes may be displayed in human readable and bar code format. Additional information is exchanged via EDI/XML.
	EPC	The EPC tag contains a unique identification number. Traceability information is obtained from the associated system and databases (e.g. EPCIS).
Traceable item is identified by batch/lot or serialised and traceability information is made available in a database	GS1-128	GS1-128 logistics unit label only needs to have an SSCC. Information is sent to a database shared between Supply Chain Partners.

Model	Technology	Comments
	EPC	The EPC tag contains a unique identification number. Traceability information is obtained from the associated system and databases (e.g. EPCIS).

* Or other equivalent barcodes standards

Create the technical guide to exchange information between parties following the criteria and recommendations defined in the GS1 Global Traceability Standard.

Example:

GS1-128 -> define AI and label models

EDI/XML -> define Message Implementation Guidelines describing the data elements to be used, and so on...

11.6.4. Validate the process

Validate your Implementation and Technical Guidelines with your GS1 MO to obtain verification of global standards compliance. This could be under a certification process for the use of GS1 standards for traceability.

11.7. Internal process model (applicable to organisations)

Define the internal process to attain traceability (stock management, production/transformation/manipulation process). GS1 standards (and all the related best practice) can also be used as a tool for the implementation of the internal traceability process.

11.8. Traceability model coherence

Once all parties and business processes have been defined, you should validate the whole model. In particular, attention must be paid to the capabilities of Parties to fulfil the goods receiving process requirements and the delivery process requirements (i.e. answer the question - will it be possible to link receiving and delivery traceability information). For instance it would not be logical for a logistics operator that performs picking operations to decide that his reception process is based on a manual procedure (e.g., no barcode labels on the pallet) but that the delivery process is based on bar-coding systems. All such inconsistencies should be eliminated to ensure success for the application of the GS1 Global Traceability Standard.

11.9. Standards Maintenance

When an organisation implements the GS1 standards, and a gap is recognized against their business needs, the organisation should contact their local GS1 MO and receive guidance on submitting a Change Request into the Global Standard Management Process (GSMP). The local GS1 MO can provide the latest standard development. To contact your local GS1 MO and get information about GS1 Standards, the following website can be used: www.gs1.org

12. Test Scenario Summary

For Conformance and Certification, please refer to the [GS1 Global Traceability Conformance \(GTC\)](#). The GTC defines essential elements for the development of best practice Traceability

13. Adherence to Architectural Principles

#	Architectural Principle	Does BRAD Adhere?	Comment
1	The requirements in the BRAD maintain the GS1 keys as the primary, mandatory identifiers.	Yes	
2	The requirements in the BRAD do not alter the formats of primary identifiers and comply with data elements as defined in the Global Data Dictionary.	Yes	
3	The requirements stated in the BRAD are backwards compatible according to the stated scope in the document. The document scope explicitly states whether requirements included in document are backwards compatible.	Yes	
4	All business requirements contained in the BRAD come from trading partners or representatives with a genuine intention to implement the standards when developed. All requirements are driven by the business needs of the trading partners.	Yes	
5	The business requirements contained in the BRAD do not violate consistency of the data architecture within each layer and between each layer of the GS1 System. For example, requirements do not alter a key used across GS1 standards or alter a reusable object without applying this change across related standards.	Yes	
6	The business requirements take into consideration the potential impact of the standard, especially with respect to implementation and maintenance. Any potential known impact is documented in the BRAD.	Yes	
7	The business requirements take into consideration the potential scalability of the standard. Any potential known impact to scalability is documented in the BRAD.	Yes	
8	The business requirements take into consideration data and process interoperability. For example, any shared objects between interoperable messages must remain consistent. Any potential known impact to interoperability is documented in the BRAD.	Yes	
9	The business requirements in the BRAD do not threaten the standardisation of the interfaces of the GS1 System. Interfaces are not limited to references to technology but also include such ideas as business interfaces and process interfaces.	Yes	
10	The business requirements in the BRAD do not create duplications with existing GS1 components. If there are potential duplications, these are documented within the BRAD with a stated rationale for the duplication.	Yes	
11	The business requirements in the BRAD do not impose implicit or explicit restrictions of any technology.	Yes	

#	Architectural Principle	Does BRAD Adhere?	Comment
12	The business requirements in the BRAD take into account a global perspective. All local (Industry or Geopolitical) requirements have a suitable rationale to explain why they cannot be handled globally. For example, a Boolean indicator of a specific regulation as opposed to a generic code list covering multiple regulations.	Yes	

14. Glossary of Business Terms

Term	Description
Actor	An actor is a role that a user plays with respect to a system.
Agreement(s)	Arrangement(s) undertaken by and legally binding on parties.
Application Identifier (AI)	The field of two or more characters at the beginning of an Element String that defines its format and meaning.
Apply	Physically mark or attach
Assign	Designate or allocate.
Asset	Can be an item that is procured/purchased and depreciated. Examples could be "bulk container", "returnable container" NOT: a disposable item; an item on consignment
Batch / Lot	The batch or lot number associates a trade item with information the manufacturer considers relevant for traceability of the item. The data may refer to the trade item itself or to items contained in it. GDD Implementation Notes A typical batch/ lot code might include a plant location, production line, date of production and shift. The format and structure will vary by organization.
Brand Owner	The party that is responsible for allocating GS1 System identification keys. 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.
Broker	A person or an entity whose activity involves the broker entering into a contract with a person or entity whereby the broker receives a commission for any business he brings to the person or company calculated as a percentage of the transaction between that entity and a third party. However, the broker normally does not actually take physical control of the goods
Business Requirement	Is a statement of <u>need</u> concerning the business area or business process under study. It is something that the system must do or a quality that the system must have. A requirement exists either because the type of product demands certain functions or qualities, or the client wants the requirement to be part of the delivered product.
Buyer	An entity that purchases the product from the Brand Owner or its agent.

Term	Description
Collect	Gather required information by any means.
Composing	Means that an item/product is composed of other items/products (See 6.1.2.6., & Figure 6.13), e.g. a cake is composed of sugar, eggs etc, reverse process is not possible
Compounder	A pharmacist, in a hospital or retail pharmacy, that creates/manufactures pharmaceutical product from compounding other pharmaceutical ingredients. Compounded product would be deemed a new product and require new identification (See GTIN Allocation Rules in Healthcare)
Consumer	The end user of a trade item or a service.
Consumer Unit (GDD Implementation)	The trade item intended for the end user.
Contained in	Means that there is an upper level of packaging and that the lower level item can be removed (See 6.1.2.6., & Figure 6.13), e.g. a carton contains 50 T-shirts, reverse process is possible
Container	The material employed in the packaging of a product. Containers include primary, secondary and transportation containers. Containers are referred to as primary if they are intended to be in direct contact with the product. Secondary and transportation containers are not intended to be in direct contact with the product.
Contract	Document/message evidencing an agreement between the seller and the buyer for the supply of goods or services; its effects are equivalent to those of an order followed by an acknowledgement of order.
Counterfeit <i>Based on World Health Organisation (WHO) Definition November 2008</i>	<p>A product is counterfeit when there is a false representation in relation to its identity⁷ history or source⁸. This applies to the product, its container or other packaging or labelling information. Counterfeiting can apply to both branded and generic products and counterfeit products may include products with correct the⁹ or with the wrong components, without active ingredients, with incorrect amounts of active ingredients, or with fake packaging.</p> <p>Quality defects or [Good Manufacturing Practice/Good Distribution Practice] non-compliance in legitimate, authorized products should not be confused with counterfeiting.</p> <p><i>7 e.g. any misleading statement with respect to name, composition, strength, or other elements</i></p> <p><i>8 e.g. any misleading statement with respect to manufacturer, country of manufacturing, country of origin, marketing authorisation holder</i></p> <p><i>9 this refers to ingredients or any other component of a product</i></p>
Distribution	The division and movement of products from the premises of the manufacturer of such products, or another central point, to the end user thereof, or to an intermediate point by means of various transport methods, via various storage establishments.
End of Life	Definition of "end of life" is dependent upon the industry and/or product. In food retail it could be when the product is used in a recipe, consumed, thrown away; in healthcare it could be when surgical gloves are used and then disposed of or when insulin is injected or a single use instrument is used once.
End to End	From finished goods to end of life of product, including products created within a healthcare facility but excluding environmental disposal, e.g. European Union (EU) Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC and 2003/108/EC
EPCIS	Electronic Product Code (EPC) Information System (IS)

Term	Description
Event	Is an occurrence of a process in a specific time or a period of time.
Event data	<p>An event has four dimensions:</p> <ul style="list-style-type: none"> - What: what physical objects were involved (GTIN) - When: when the event took place (timestamp) - Where: where the event took place (Location identifier (GLN)) - Why: what business step was being carried out <p>See also "Transactional data"</p>
Extended (as in Extended Supply Chain)	<p>Extended indicates that whatever the readers view of what constitutes the "supply chain" Traceability goes beyond that view.</p> <p>Extended implies both upstream and downstream supply chain, e.g. from source material (e.g. seed to grow wheat) through manufacture (making bread) to consumption or use (e.g. eating the bread) to destruction (e.g. composting stale bread).</p> <p>Usually what constitutes the "supply chain" depends on the individual's perspective, e.g. for a manufacturer, the supply chain may be raw materials to delivery of finished goods or for a nurse, for pharmaceuticals, may be from pharmacy to consumption by the patient.</p>
Extension	<p>An extension is a standard defining additional requirements to a generic standard required to meet specific business needs or practices. An industry specific extension to the GS1 Global Traceability Standard could set up, for example, additional data to record or leverage minimum requirements concerning the use of bar-codes or RFID. It is different from "implementation guidelines" the purpose of which is to explain in detail an existing standard in a given context (e.g. country, type of product) and to help the user during the implementation phase.</p>
External Traceability	<p>External traceability takes place when instances of a traceable item are physically handed over from one traceability partner (traceable item source) to another traceability partner (traceable item recipient).</p>
Forwarding Agent	<p>A person or entity engaged in providing, either directly or indirectly, any service concerned with clearing and forwarding operations in any manner to any other person and includes a consignment agent.</p>
Global Location Number (GLN)	<p>The GS1 Identification Key used to identify physical locations or legal entities. The key is comprised of a GS1 Company Prefix, Location Reference, and Check Digit.</p>
Global Trade Item Number (GTIN)	<p>The GS1 Identification Key used to identify trade items. The key is comprised of a GS1 or U.P.C. Company Prefix followed by an Item Reference Number and a Check Digit.</p>
Global Returnable Asset Identifier (GRAI)	<p>The GS1 Identification Key used to identify Returnable Assets. The key is comprised of a GS1 Company Prefix, Asset Type, Check Digit, and optional serial number.</p>
GS1 System	<p>The specifications, standards, and guidelines administered by GS1.</p>
Homogeneous Pallet	<p>Homogeneous Pallet is composed of identical products (identified with the same item identification (GTIN)) originating from the same Batch / Lot.</p>

Term	Description
Intellectual Property (IP)	<p>Copyright protects material, such as literature, art, music, sound recordings, films and broadcasts</p> <p>Designs protect the visual appearance or eye appeal of products.</p> <p>Patents protect the technical and functional aspects of products and processes.</p> <p>Trade Marks protect signs that can distinguish the goods and services of one trader from those of another.</p> <p>Also covers trade secrets, plant varieties, geographical indications, performers, rights and so on. Often, more than one type of IP may apply to the same creation.</p>
Identification	Refer to GLN and GTIN
Identification Carrier	Mark / tag / label / accompanying document sometimes called “passport” or “identity card” or “Pedigree” in some industry sectors
Intermediate Product	Partly processed product that must undergo further manufacturing steps before it becomes a bulk finished product.
Internal Process	A series of actions, changes or function(s) within an organisation or an organisation that brings about a result.
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 several instances of traceable items are output.
Link	Recording the information necessary to establish the relationship to other relevant information.
Location	<p>A place where a traceable item is or could be located.</p> <p>[ISO / CD 22519] A place of production, handling, storage and / or sale.</p>
Logistic Unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain. It is identified with SSCC.
Logistics Provider (including Third Party Logistics Providers (3PLs))	<p>A logistics provider is a person or entity that provides logistics services for part or all of the supply chain management functions for other entities (manufacturers or suppliers). Third party logistics providers are typically specialized in integrated warehousing and transportation services that can be customized according to the demands and delivery requirements of their customers. A logistics provider does not hold proprietary rights over the product they store or distribute.</p>
Master Data	<p>Master Data describes each item and party involved in supply chain processes. Master Data is defined as data having the following characteristics:</p> <p>Permanent or lasting nature</p> <p>Relatively constant across time, not being subject to frequent change</p> <p>Accessed / used by multiple business processes and system applications.</p> <p>Can be either neutral or relationship dependent.</p>
Mixed Pallet	Mixed Pallet is composed of one or more different products (identified with different item identification (GTIN)).
Party	<p>A Party (or) Location is any legal 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 Global Location Number (GLN).</p>

Term	Description
Pedigree	A record that traces the ownership and transactions of a product as it moves among various trading partners - from the manufacturer to e.g. the pharmacy, hospital, or other entity.
Process	In a GS1 context this refers to a business process. This is a series of actions, or functions that transform an input into an output to assist in meeting an organisation's objectives. Inputs and outputs may be data, physical entities or a mixture of both, examples being order to cash, collaborative planning, warehouse management, TRACEABILITY and cross-docking.
Product Recall	The removal from distribution, sale, consumption or use of products which may pose a health and safety risk to consumers (GTS) Shall mean any measure aimed at achieving the return of a dangerous product that has already been supplied or made available to consumer / end users by the producer or distributor (EU Directive 2001/95/CE General Product Safety)
Provider	As in Healthcare Provider: A GP, Pharmacist, Hospital
Quality System	An appropriate infrastructure, encompassing the organisational structure, procedures, processes and resources, and systematic actions necessary to ensure adequate confidence that a product (or service) will satisfy given requirements for quality.
Quarantine	The status of products isolated physically or by other effective means while a decision is awaited on their release, rejection or reprocessing.
Recall	Shall mean any measure aimed at achieving the return of a dangerous product that has already been supplied or made available to end users by the producer or distributor (EU Directive 2001/95/CE General Product Safety)
Record	Act of creating a permanent piece of information constituting an account of something that has occurred.
Sampling	Operations designed to obtain a representative portion of a product, based on an appropriate statistical procedure, for a defined purpose, e.g. acceptance of consignments or batch release.
Seller	The party selling the traceable item to a buyer.
Serial Shipping Container Code (SSCC)	The GS1 Identification Key used to identify logistics units. The key comprises an Extension digit, GS1 Company Prefix, Serial Reference, and Check Digit.
Serialized Global Trade Item Number (SGTIN)	SGTIN is a method of identifying 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 GS1 bar codes have traditionally been used, the SGTIN specification combined with an EPC 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 Traceability 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.
Shipper	Party responsible for the shipment of goods.
Storage	The storing of products up to the point of use or onward distribution
Store Data	Keeping information available by any method.

Term	Description
Supplier	The party that produces, provides, or furnishes an item or service.
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 event data.
Traceability Data Creator	The Traceability Partner that generates traceability information.
Traceability Data Recipient	The Traceability Partner authorized to view, use, and download agreed traceability information.
Traceability Data Source	The Traceability Partner that provides the agreed traceability information.
Traceability Partner	Any Trading or traceability Partner involved in the traceability process e.g., Traceable Item Creator, Traceable Item Source, Traceable Item Recipient, Transporter, Brand Owner, Traceability Data Source, and Traceability Data Recipient. NOTE: The term "partner" does not imply there is a direct business relationship or partnership between parties involved in traceability
Traceable Item	<p>A physical object that may or may not be a trade item, where there may be a need to retrieve information about its history, application, or location. The level at which the traceable item is defined is dependent on the industry and degree of control required (for example within a product packaging or logistical hierarchy). It could be tracked, traced, recalled or withdrawn. It could exist in multiple locations at the same time (for example, if identified at the trade item and batch level).</p> <p>A traceable item may be related to another traceable item.</p> <p>It is the choice of the Traceability Partner which identification level (e.g. GTIN or Lot/Batch or serial level) to use for the traceable item.</p> <p>See also definition for process</p>
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 Recipient	The Traceability Partner that receives the traceable item.
Traceable Item Source	The Traceability Partner that despatches or provides a traceable item.
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
Trace Request Initiator	The person who starts the trace request and requires a response from the Traceable Data Source.
Tracing	<p>Tracing is the capability to identify the origin and characteristics or history of a particular traceable item upstream based on criteria determined at each point of the supply chain by reference to records held about it.</p> <p>Trace or Tracing backward or ascending traceability</p>
Tracking	<p>Tracking is the capability to locate or follow the path of a particular traceable item downstream based on criteria determined at each point of the supply chain by reference to records held about it.</p> <p>Track forward or descending traceability</p>
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.

Term	Description
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.
Transactional Data	Information necessary for the business process being executed. For example, item codes and ordered quantities are transactional as these are mandatory fields within a purchase order: and, may vary by purchase order.
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, compounding, packing and repacking traceable items.
Transit	The period during which products are in the process of being carried, conveyed, or transported across, over or through a passage or route to reach the destination.
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.
Wholesaler	Any person or organisation that is engaged in wholesale distribution of products, including but not limited to, manufacturers, re-packers, own-label distributors, private-label distributors, brokers, warehouses – including those for manufacturers and distributors who conduct wholesale distribution.
World Health Organisation (WHO)	WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.
Withdrawal	The removal of unsuitable products from distribution; does not need to be communicated to the consumer. Shall mean any measure aimed at preventing the distribution, display and offer of a product dangerous to the end user (EU Directive 2001/95/CE General Product Safety)

15. Summary of Changes

Change	BRAD Version	Associated CR Number
GTS Approved Version	1.0	CR 05-000309
Updated version based on <ul style="list-style-type: none"> • Reviewed by Traceability in Healthcare Work Team • Completion of Traceability Work Group Public Review • Posted for eBallot 	1.1	CR 08-000130

Change	BRAD Version	Associated CR Number
<ul style="list-style-type: none"> • Section 5.3 <ul style="list-style-type: none"> ○ Added “GS1” to DataMatrix ○ Added “GS1” to XML • Figure 6-1 corrected “process” Typo • Section 7.1 Table 7.1 BR11: <ul style="list-style-type: none"> ○ Removed (**) as it was consolidated into (*) ○ Replaced GS1-8 with EAN-8 • Section 9.1 <ul style="list-style-type: none"> ○ Replaced “GS1-128 Application Identifier” with “GS1 Application Identifiers” ○ Added revised note Note: as of July 2005, SGTIN only exists for RFID technology using EPC. As bar code solutions a combination of GTIN plus serial number can be found as appropriate counterpart (e.g. GS1 DataMatrix or GS1-128).” • Table 10-1 Point 7 Replaced Reduced Space Symbologies with 2D Symbologies 	1.1.1	Errata Changes
<ul style="list-style-type: none"> • Section 10 Removed sector specific examples such as Wine Supply Chain • Section 7 Reformatted table by adding Corresponding Standard and Corresponding Use Case column headers • Section 13 Added Adherence to Architectural Principles • Section 14 Harmonized Glossary of Business Terms with GDD. 	1.2.0	09-143
Update per public review discussion and resolutions	1.2.1	Not Applicable
<ul style="list-style-type: none"> • eBallot Approved • Page 39 BRU 8 figure reference corrected to Figure 6-11 • Updated document to issue 1.2.2 	1.2.2	Errata Change
<ul style="list-style-type: none"> • Section 8 Added Product Recall Process • Glossary of business terms: Added product recall and updated withdrawal definition 	1.3.0	CR 11-281
<ul style="list-style-type: none"> • Updated for publication 	Issue 1.3.0	WR 11-281 eBallot Approved